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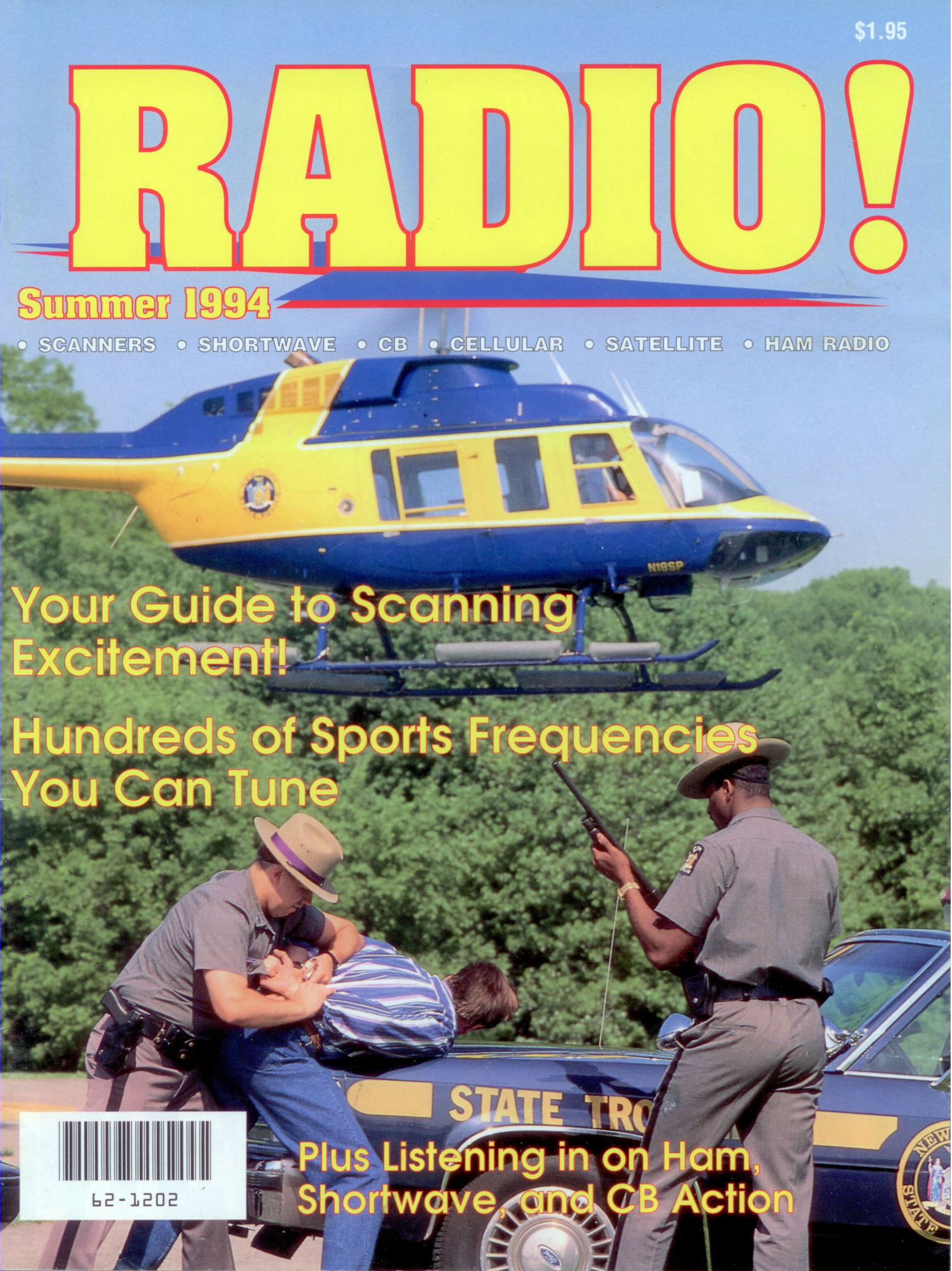

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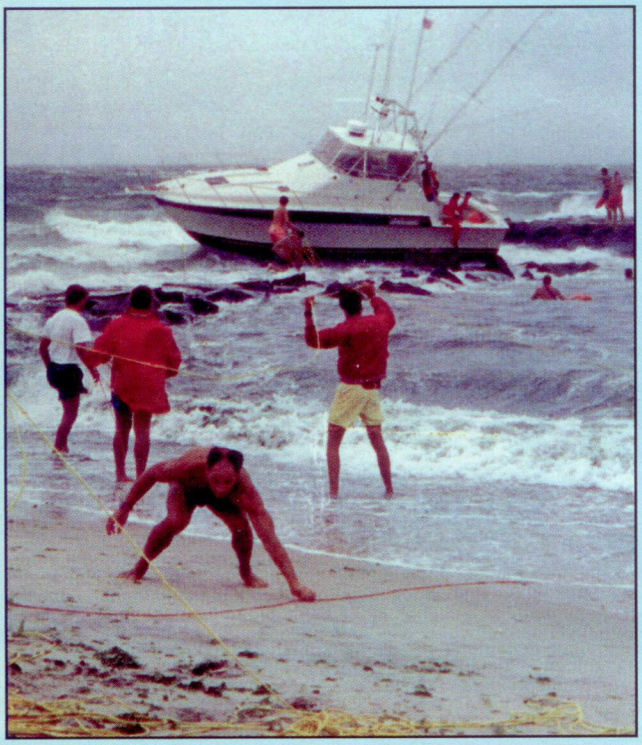

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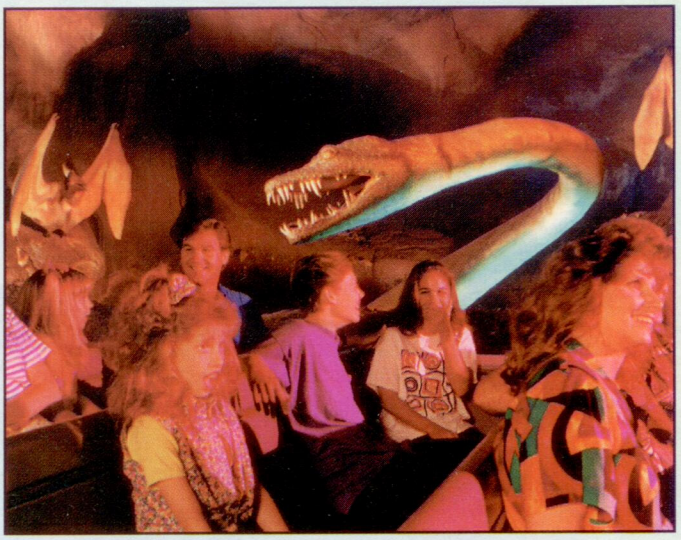

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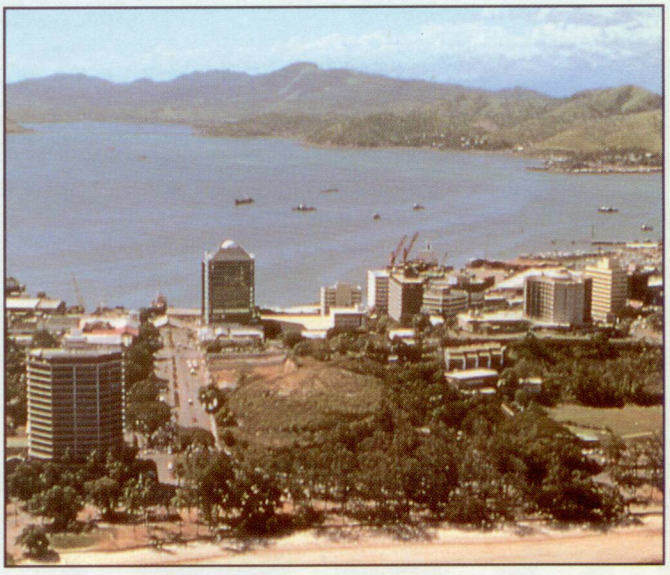

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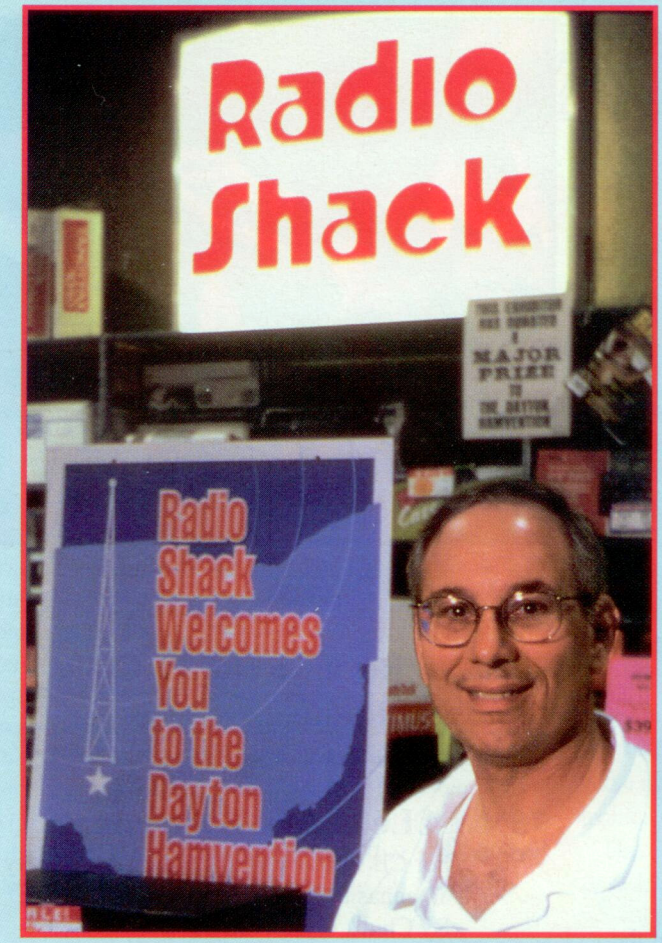

Welcome to the summer edition of Radio! *magazine. In spring, just as the flowers start to bloom, amateur radio operators, or hams, as they are often called, also go through an annual rite of spring.*

The Dayton Hamvention, called by many the Mecca of hamdom, was held in the last week of April and it was exciting as always.

I, along with 35 to 45 thousand of my ham friends, gathered to see the new and not-so-new in communications products and accessories.

But, you don't have to be a ham to attend Dayton or any of the hundreds of similar gatherings throughout the summer and fall.

I encourage everyone with an interest in radio communications to attend one of these events to see for themselves how valuable and informative they can be.

For now, remember, this is your magazine. As always, we welcome your comments about the publication. Let us know what you do and don't like about Radio! *magazine.*

Have a great summer and be sure to get all those outdoor antenna projects completed before the cold winds of winter are upon you.

Robert B. Miller AA5FL

Vice-President, Radio Shack

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Offices: Radio Shack, 700 One Tandy Center, Fort Worth, TX 76102-2816. *Radio!*, cover price $1.95, is available only through Radio Shack stores.
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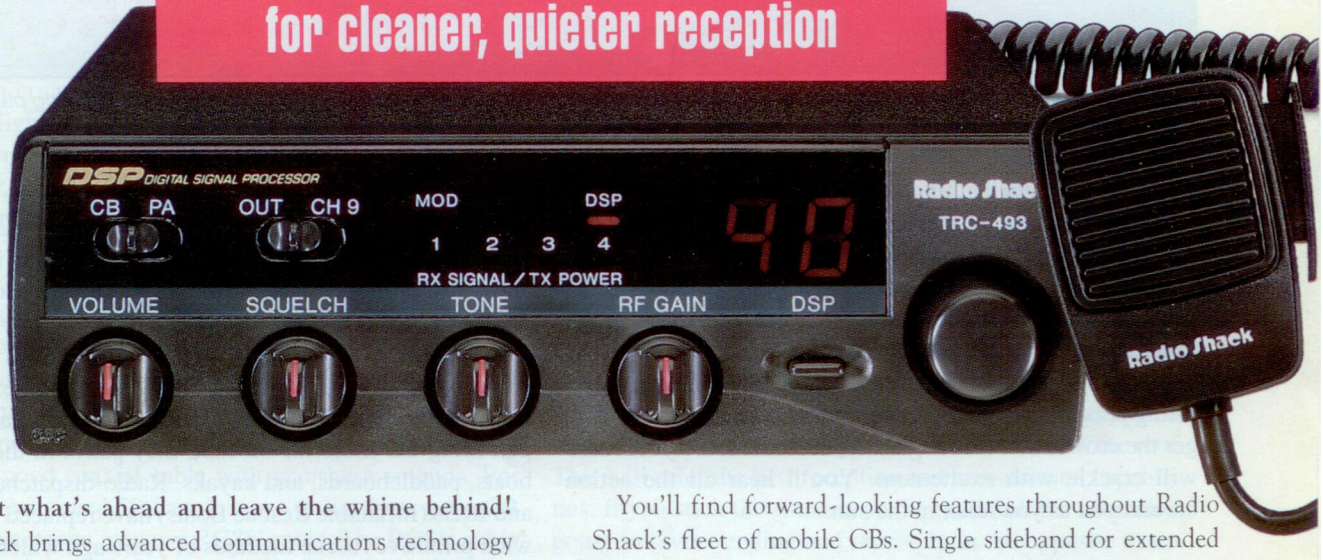
Enjoy Family Vacations Without That Annoying Whining

Radio Shack's mobile CB with DSP eliminates whines and whistles for cleaner, quieter reception



Find out what's ahead and leave the whine behind! Radio Shack brings advanced communications technology to the Citizens Band in the TRC-493 2-way radio. *Digital Signal Processing* (DSP) removes the annoying whines and whistles often heard on busy CB channels and dramatically reduces noise to boost intelligibility. The result? Clean, quiet reception that's easy on your ears.

You'll find forward-looking features throughout Radio Shack's fleet of mobile CBs. Single sideband for extended talk range. Weather band for instant updates. Even a full-power, 40-channel model priced less than $50 every day.

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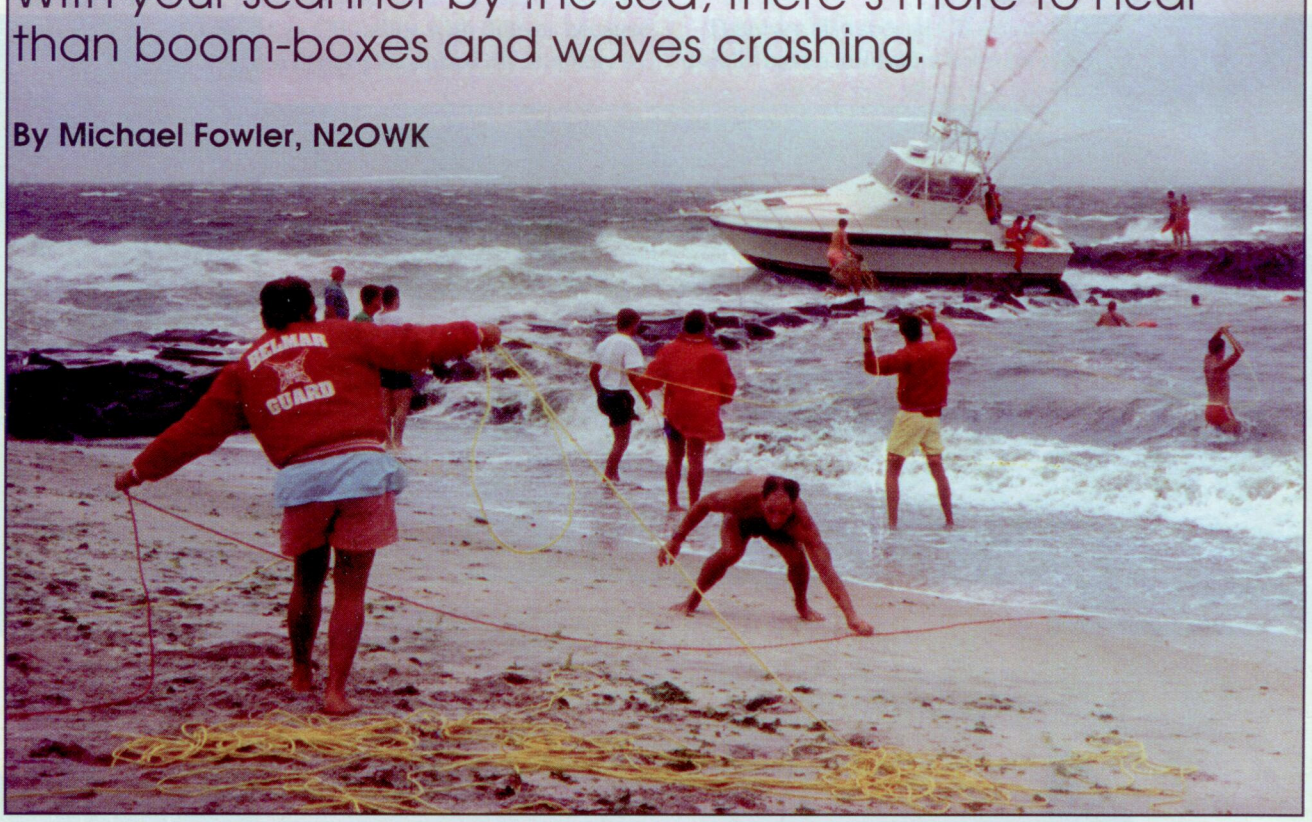
RADIO! Scanner Listening

Listening In On Lifeguards

With your scanner-by-the-sea, there's more to hear than boom-boxes and waves crashing.

By Michael Fowler, N2OWK



This is not a drill! Belmar, New Jersey, lifeguards rescued the occupants of this foundering boat. This is where the training pays off as all were safely brought to shore. (Photo by Beverly A. Streeter.)

Pack up your bathing suit, towel, umbrella, and your scanner, and let's head for the beach! During the summer months, when millions of beachgoers flock to the seaside, there's a lot of monitoring action. Listening in on lifeguard radio communications will put you right on the lifeguard stand as they watch over the bathers.

Monitoring a busy ocean lifeguard crew provides an interesting perspective on beachfront safety operations. The bigger the crowd, and the rougher the surf, the more your radio will crackle with excitement. You'll hear all the action around you as you relax in the sun.

Lifeguarding through the Years

The earliest lifeguard organizations were established by the seaside hotels in Atlantic City during the 1870s. With funding from the railroads, they advertised that their patrons would be safe in the ocean, carefully watched over by protective lifeguards. As time went on, seashore communities realized the public relations benefit of providing lifeguards for vacationers, and they, too, began to establish their own lifeguard services. By the 1880s, a complete summer industry was established—ocean rescue.

Today's lifeguards differ significantly from the Life Saving Service of the 1900s, the precursor of the U.S. Coast Guard. Back then, they rescued ships and people in distress and patrolled the coast during the winter storm season. Equipment and methods of operation were substantially different.

Now, men and women oversee bathers from lifeguard stands and towers, close to the water's edge. They're equipped with modern rescue cans and lines. In addition to patrolling the shoreline on foot, they patrol in the water in boats, paddleboards, and kayaks. Radio-dispatched jet skis and IRBs (Inflatable Rescue Boats) have replaced the somewhat primitive rescue methods of years ago which included canon-fired lines. And their four-wheel drive trucks packed with rescue gear can respond to remote locations quickly.

Modern Ocean Lifeguarding

All over the country, you'll find instances of the courage and skill of lifeguards. A recent Florida headline read, "Lifeguards to the Rescue...Hurricane Riptide Sucks Hundreds Out to Sea." In New Jersey, on the weekend following Labor Day, 1990, there were an estimated 100 bathers pulled offshore by strong rip currents. The Los Angeles County

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Note: An FCC Amateur Radio License of Technician Class or higher is required to transmit with HTX-202.

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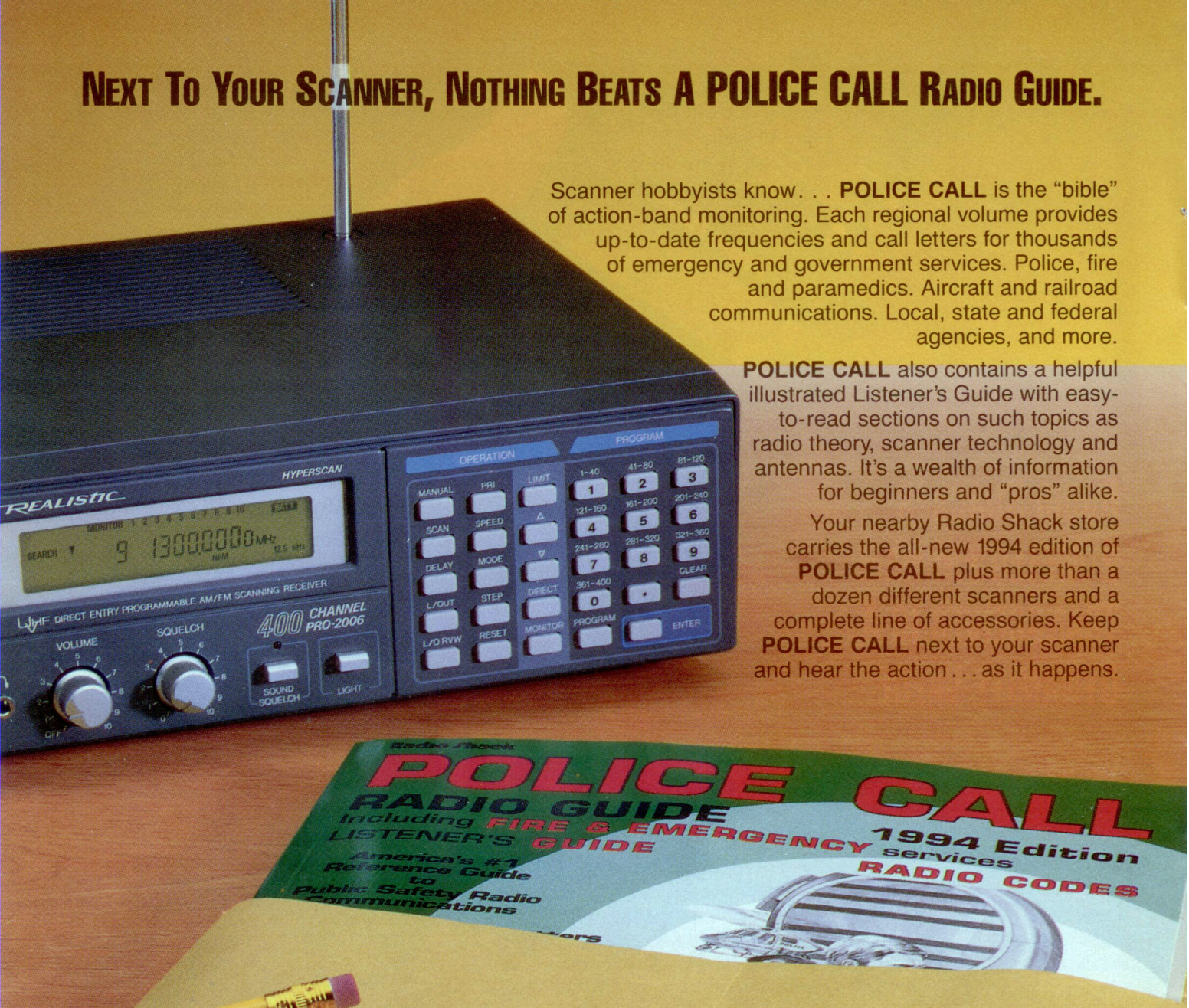
POLICE CALL also contains a helpful illustrated Listener's Guide with easy-to-read sections on such topics as radio theory, scanner technology and antennas. It's a wealth of information for beginners and "pros" alike.

Your nearby Radio Shack store carries the all-new 1994 edition of **POLICE CALL** plus more than a dozen different scanners and a complete line of accessories. Keep **POLICE CALL** next to your scanner and hear the action . . . as it happens.



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INSIDE INFO

Typical Lifeguard Whistle Communications

One blast—Attention to other lifeguards
Two blasts—Used for crowd control
Three blasts—Lifeguard emergency

Lifeguard unit annually rescues thousands of bathers. And last summer, lifeguards in the Mid-Atlantic states alone made over 15,000 ocean rescues without a single loss. This remarkable record shows that hard work, rescue ability, and training pay off. Anyone who has ever witnessed, for example, a mass rescue in heavy surf knows exactly what we mean.

Bathers get in trouble in a variety of circumstances. The ocean abounds with certain dangers for the unwitting. People can get swept out beyond the breakers by rip currents, get knocked down by dangerous shorebreaks, or be pulled outside bathing areas by fast moving lateral sweeps. Sometimes head and neck injuries can result from beachgoers diving into shallow water.

Aside from such ocean dangers, lifeguards are also faced with a myriad of beach-related problems—everything from minor shell cuts, jellyfish stings, and sunburns, up to more serious problems, such as heart ailments. Lifeguards have also been heroes to millions of parents, reuniting them with their children who wandered off along the beach.

Methods of Lifeguarding

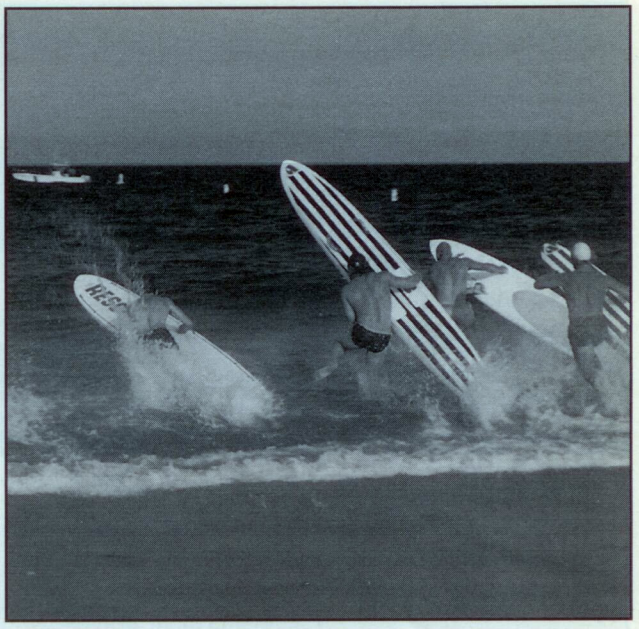
In-shore rescues are usually made with the rescue can or torpedo, a red flotation device which the lifeguard swims out with. The "torp," as it is commonly known, is handed to the victim. Depending on the circumstances, both rescuer and victim are pulled to safety by the line, a length of polyethylene rope fed out from a line bucket and attached to the torp. Once properly hooked up, a lifeguard with several victims can be pulled to shore in less than a minute.

Bathers in distress further offshore can be pulled to safety with lifeguard surfboats, powerboats, IRBs, paddleboards, kayaks, jet skis, and on occasion, rescued by helicopter. Each of these pieces of modern rescue equipment is much faster, and safer, than swimming through the surf.

The Lifeguards and Their Rescue Training

The *United States Lifesaving Association* (USLA) is the nationally-recognized organization for open water lifeguards. Through its progressive public education campaigns, much has changed for the better over the years. The USLA promotes educational programs, training and certification, and competition. Local and national symposia highlight topics like developing training programs and legal issues concerning lifeguards. The focal point is to improve lifeguarding professionalism and certification standards.

Learning rescue techniques is an integral component of ocean lifeguarding. Ocean lifeguards undergo rigorous conditioning and receive classroom, as well as on-the-job, training to earn their open water certification. Rookies receive an intensive, season-long initiation to lifeguarding. They learn by doing everything from surf rescues to much less glorious tasks like painting and maintaining equipment. The learning, training, and conditioning never stops—it's an ongoing process as guards continually hone their lifesaving, first aid, CPR, and beach management skills.



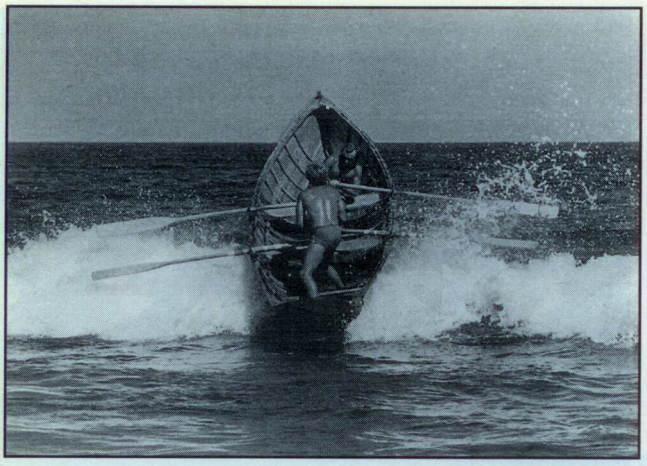
Paddleboards are an effective and fast way to assist victims in the surf. Competitions build speed and confidence in handling the 12-foot rescue boards. (Photo by Anthony Salerno.)

This intense training also helps prepare lifeguards for tournaments, a very popular form of competition along both coasts that also promotes the necessary lifesaving skills. The tournaments are colorful spectacles held during July and August. Hundreds of lifeguards, both men and women, gather for highly competitive events in swimming, paddling, rowing, kayaking, and rescue skills. Watching guards going out into the surf, especially in their rescue boats, provides tense excitement for the spectators—a 17-foot lifeguard boat surfing in on a large wave highlights the skill and training necessary for competition. Trophies are awarded to the victors, but even more important is the prestige associated with winning a highly-coveted championship.

Early Lifeguard Communications

Lifeguards didn't always use radios. Ironically, their oldest communication device is still in common use today—the whistle. These devices are especially effective for crowd control, but are also used to signal other guards (see box). Whistles are effective up to about 1/4 mile distance.

Semaphore flags are still used for communications. Lifeguard organizations in Ocean City, Maryland, and Bethany Beach, Delaware, are perhaps the last remaining groups in the U.S. to use this system. In Ocean City, it's been a tradition with the rescue units since the 1930s and takes rookies



A surfboat breaks the waves in Avon-by-the-Sea, New Jersey. (Photo by Robert Longo.)

approximately two weeks to learn. Complete messages can be relayed up and down the 10 and a half miles of beach. This summer the flags will be augmented with Ocean City's new 800 MHz radio system.

Telephone communications preceded radios and became popular during the 1960s and 1970s. Lifeguard telephones were set up in several ways. In the best case, lines were run down to posts erected in the sand. Each day, the lifeguard bench was placed in the vicinity of this post and the telephone jacked in. This method worked reasonably well for about 10 years.

While handheld FM radios were used by some U.S. lifeguarding agencies as early as the late 1960s, it wasn't until the mid to late 1970s that they came into their own. Improvements in technology made them reliable, practical, and affordable enough to be used by most units. Lifeguards were usually found on frequencies shared with other departments, like public works, first aid squads, or even the police on secondary channels. Some radios had two channels, with the ability to switch frequencies for summoning police or first aid help. Primary lifeguard operations, however, were usually on a different frequency from the municipal police.

Modern Lifeguard Communications

The radio systems in use for lifeguarding today have changed considerably. The basic systems make use of 1 or 2-watt simplex radios on low power itinerant business frequencies. The radios have an effective range of about two miles, and, since beachfront areas are usually large unobstructed open areas, this setup can work quite well. Emergency calls have to be routed to a base location equipped with a telephone.

A more common, and slightly more complex, approach is a simplex or repeater communication system that's tied in with the city or county. Lifeguard rescue units are assigned their own frequency, or to secondary police or first aid frequencies. Within this system, lifeguards are linked directly to other emergency units. The lifeguards in jet skis or IRBs will use communication headsets and a radio in a special waterproof marine bag.

At the most sophisticated level, a complex 800-MHz trunked system is used, as it is in San Diego, California. There, the radios have 15 channels, with two main dispatch frequencies, seven tactical frequencies, and the capability of accessing virtually any San Diego emergency division. Some supervisors even have phone patch capabilities. Their VHF marine and 800-MHz system links 180 lifeguards using 90 handheld radios, 21 lifeguard rescue vehicles, nine rescue vessels, seven base stations, and a 24-hour central communications center. A total of seven repeater sites covers the area's 17 miles of oceanfront and 26 miles of beach along Mission Bay.

U.S. Coast Guard Communications

U.S. Coast Guard	Use	Frequency
Channel 16	Distress/Calling	156.800
Channel 22	Liaison/Talking	157.100
Channel 81	Operations	157.075
Channel 83	Operations	157.175

A Sampling of Lifeguard Frequencies

Lifeguard Agency	State	Frequencies
California State Parks & Rec.	CA	866.4625, 867.4625
Coronado	CA	154.110
San Diego City	CA	New 800 trunked system for '94
San Diego County	CA	155.820
Rehoboth Beach	DE	154.875, 156.030
Pompano Beach	FL	463.0375
Chicago Park District	IL	45.92
Ocean City	MD	155.370R, 155.205
Atlantic City	NJ	453.350, 39.34
Avon-by-the-Sea	NJ	45.32
Beach Haven	NJ	155.160M
Belmar	NJ	150.790
Bradley Beach	NJ	42.28
Cape May City	NJ	153.860
Island Beach State Park	NJ	159.465
Long Beach Township	NJ	46.00
Manasquan	NJ	154.025
Monmouth County Park System	NJ	151.310R
North Wildwood	NJ	155.160
Ocean City	NJ	155.145
Sea Girt	NJ	158.910
Ship Bottom	NJ	460.125
Spring Lake	NJ	154.600
Wildwood	NJ	155.745
Wildwood Crest	NJ	158.865
Ventnor City	NJ	45.32
Myrtle Beach	SC	461.400
North Beach Rescue Service	VA	155.220
Virginia Beach Lifesaving Service	VA	155.235, 155.295
Virginia Beach Patrol	VA	154.515, 155.295

This is a typical East Coast Lifeguard setup. (Photo by the author.)

One of the better simplex communications systems is installed in Belmar, New Jersey, a popular resort and the setting for the television show *Down the Shore*. Belmar Beach Patrol averages over 500 rescues and first aid calls per season, and its radio system must coordinate all the action. Each beach location is equipped with a handheld transceiver, and headquarters houses a 35-channel base unit capable of directly contacting police, first aid, Shark River Coast Guard Station, and several surrounding municipalities. Supervisors carry multi-channel handhelds and can communicate on a private channel.

What You'll Hear

Lifeguard units can be monitored right from your beach blanket. Most communications are the routine matters of operating a busy beachfront. Radios are often used to reassign lifeguards from one location to another, particularly during times of bad water conditions. They're also used to notify crews about rip currents or any other dangerous surf condition, as well as to locate lost children and parents.

You'll hear the extensive communications during lifeguard competitions as offshore judges in boats radio in event results or rules infractions. Radio communications simplifies the judging process and enables officials to cover a large area of beachfront.

Radios will also bristle with excitement during rescues or first aid efforts. Guards will usually notify supervisors that they're working an emergency. This way, if additional help is needed, support groups have a bit of time to prepare.

When an all-out emergency is called, guards dash with rescue gear and first aid kits to the site of the problem. You'll hear them call in for backup and first aid units. On expansive beaches, rescue trucks with paddleboards and additional rescue equipment are dispatched to the location. Radio-equipped rescue boats and jet skis may also be called into action. They're often waiting just offshore to respond even more quickly to emergencies.

You may also hear the IRBs commonly used for ocean rescue and patrol. They'll leave dock in the morning and patrol up and down the coast throughout the day. Usually they're staffed by at least two lifeguards and communications between them and lifeguard headquarters can be monitored. Occasionally, you can even monitor rescue helicopters if they're pressed into service.

Lifeguard crews are an important part of the beach landscape, and listening to their communications is one of the many exciting parts of scanner monitoring. And best of all, your scanning enjoyment is enhanced tenfold as you relax on the beach to listen in on these well-trained, dedicated ocean rescue crews.

So, pack up your beach gear, your scanner, bring along your frequency list, and we'll see you at the beach! ■

Seaside Equipment Protection

Taking your handheld to the beach in a salt water and sand environment requires some special preparation. Don't forget, your scanner is a precision radio receiver, and you've got to give it proper care—especially at the beach where there are some natural enemies of electronics.

Your scanner's first beach enemy is the sun—don't let it get fried by direct exposure to the tanning rays! Look for a cool, shady spot for your handheld, either under a tree or an umbrella. Avoid handling the unit with greasy suntan lotions, and, of course, keep the unit out of the sand and away from salt spray.

A best bet for real protection for your scanner investment is a waterproof marine radio bag. These are designed just for this purpose and will seal the radio from water and sand. But they *will not* protect your radio from heat or condensation. If droplets of water form on the inside of the bag, remove the unit until the bag is completely dry.

Another consideration is, of course, security. When you cool off in the ocean, be sure to leave your radio with responsible people, perhaps a trustworthy family sitting nearby if you're alone. An alternative is to leave the radio at the lifeguard stand—but be sure to turn it off!

Batter Up! Scanning Sports Action

Whether it's auto racing or baseball you enjoy, you're sure to be in-the-know with your handheld scanner. Here's how.

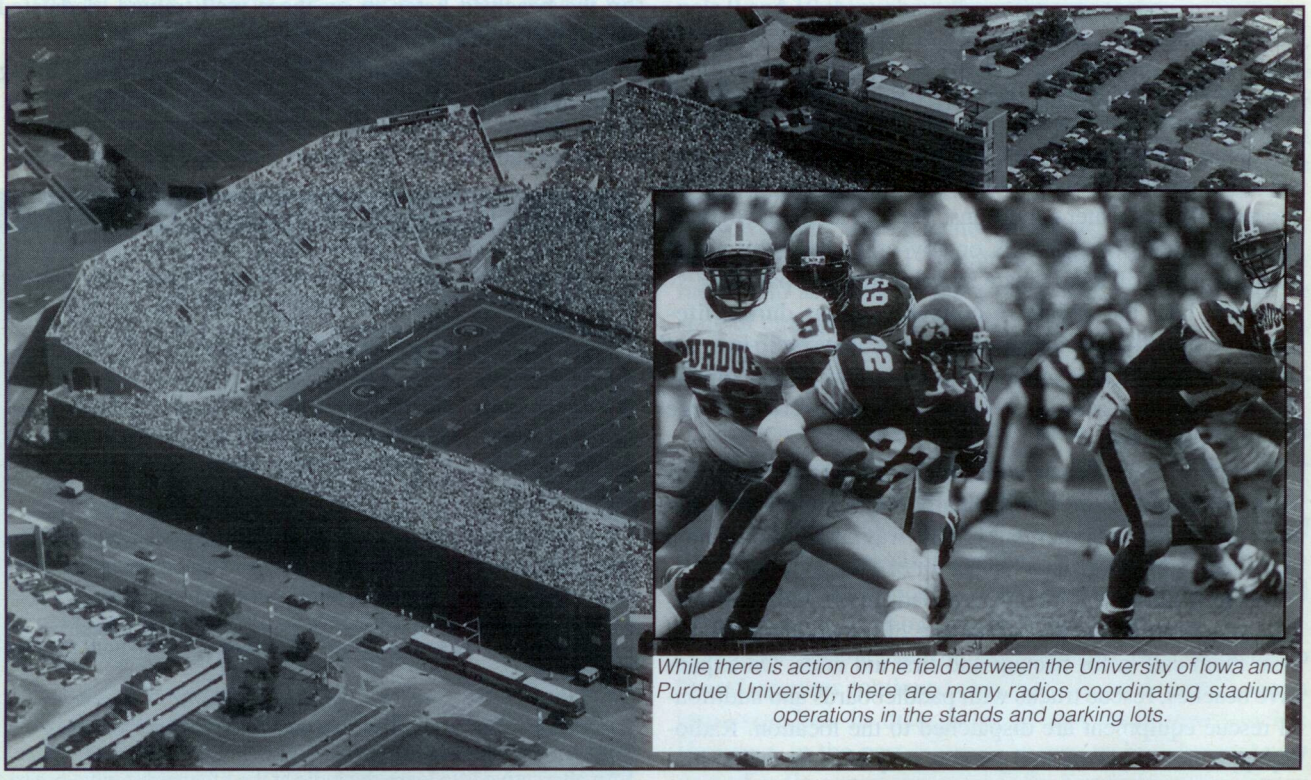
By Chuck Gysi, N2DUP

Without a doubt, some of the most exciting scanning around can be found during sporting events! Whether it's a manager calling to the bullpen for a left-handed pitcher, security guards breaking up a fight in the stands, or the lead racer telling his crew he needs to return to the pits, there's plenty of scanning action to hear at most major sporting events.

If you know what frequency ranges to search, your handheld scanner will add plenty to your enjoyment of sporting events. Just imagine, for instance, that you're at a car race, hearing first-hand from a driver why he's experiencing problems with his car. You'll also know why security guards run past your seat at a ball game, or you'll hear updated scoring information from checkpoints at an event that takes place over a wide area.

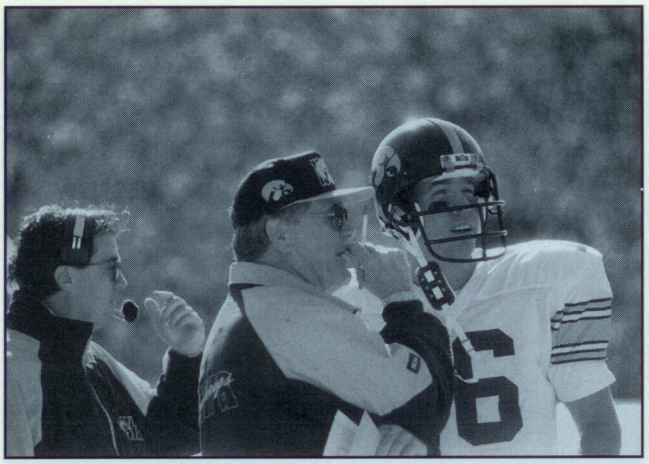
Where to Look

Business radio frequencies contain most sporting communications. If you search bands allocated for businesses while at a sporting event, you'll likely stumble across communications all around you. Walkie-talkies are the most popular form of two-way radio used at sporting events because they give users the flexibility to be anywhere they can walk. While mobile two-way radios are also used, they typically tie the user to their vehicle, unlike walkie-talkies.



While there is action on the field between the University of Iowa and Purdue University, there are many radios coordinating stadium operations in the stands and parking lots.

The stadium is packed for a Big Ten football game at the University of Iowa in Iowa City. Campus police can be found on their routine frequency of 453.975 MHz during games, while the university's athletic department uses 453.500 MHz, a local government radio frequency.



Some coaching staffs use two-way radios, but others use hard-wired headsets that cannot be monitored. If radios are being used, look for a radio attached to the headset. Otherwise, the wire trails the staffer on the ground.

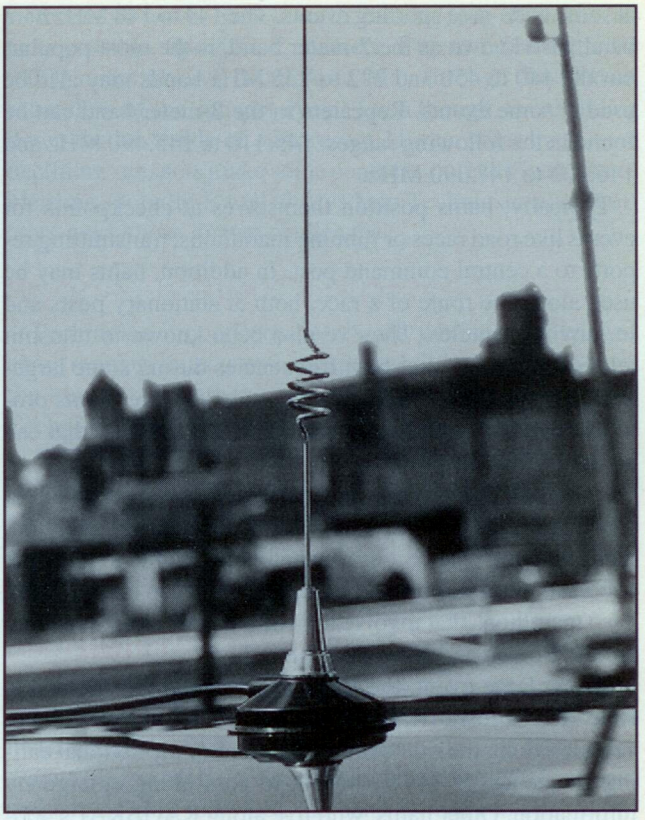
These days it's very rare for sporting events to use frequencies in the VHF low band from 30 to 50 MHz. Almost all sports communications now take place in the VHF high, UHF, and 800-MHz bands. Some sports communications now even take place in the newer 900-MHz band.

The most popular frequencies for sporting events are three itinerant business radio frequencies (151.625, 464.500, and 464.550 MHz) and two low-power "splinter" business frequencies, which are sandwiched between regular high-power frequencies on UHF. For instance, certain frequencies, such as 464.600, 464.625, and 464.650 MHz, are for routine base, mobile, and repeater use. But the frequencies offset by 12.5 kHz between those channels, such as 464.6125 and 464.6375 in the above example, may be used for low-power walkie-talkies and repeaters. The power output is limited to 2 watts, so you won't hear these transmissions over a wide area. In fact, for most sporting events, unless you're on-site or within a few blocks, you won't hear the communications because most radios are low power.

If you want to search for new frequencies that might be used during a sporting event, search the VHF business radio bands first, from 151.625 to 151.955 and 154.515 to 154.600 MHz. On UHF, check the low-power band from 457.525 to 457.600 MHz and then the 460.650 to 470.00 MHz band. On the higher bands, you'll want to search from 851 to 866 MHz and 935 to 940 MHz.

While more and more sports participants are gradually moving to the 800 and 900-MHz bands, most sports communications will be found in the small segments of the 151 and 154-MHz bands or between 461 and 465 MHz. For an event as large as the Olympics, the U.S. and Canada typically set up communications on systems that are on unused TV channels 14 through 20. Because of the large number of radios and pagers needed at such an event, using other routine channels would cause problems with the regular users of those frequencies.

Other places worth checking are the low-power, no-license 49-MHz channels of 49.83 through 49.89 MHz (some professional ice hockey teams can be found here), along with the 155-MHz special emergency frequencies used by the National Ski Patrol on ski slopes all across the U.S.



Look for cellular telephone antennas such as this one during some sporting events. When cellular phones are used, you may not hear much action on two-way radios.

Media Coordination

Other big users of radios at major sporting events, naturally, are the news media. From TV and radio stations to newspapers and magazines, they all have to coordinate their crews covering an event. For TV and radio coverage, check the 161.640 through 161.760-MHz band, as well as the 450 to 451 and 455 to 456-MHz bands. Newspaper reporters and some video production services may show up in the 173.225 to 173.375-MHz and 452.975 to 453.00-MHz segments.

In addition to their routine communications channels, some news media may use business frequencies as discussed earlier. For instance, ESPN uses the 450 and 464-MHz bands for its on-site coordination of sporting events. Wireless microphones can be found in a variety of places, but the most likely place for those used by broadcasters is the 174 to 216 MHz band, which is also used for TV Channels 7 through 13. Not all scanners can tune in the 174 to 216 MHz band, but some, like the Radio Shack PRO-2006, can.

Amateur Radio in Sports

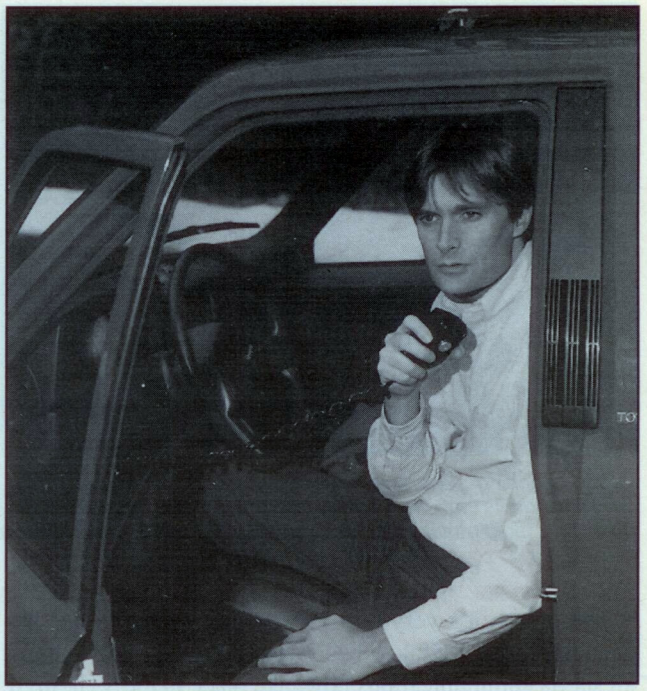
Hams like to help out when it comes to large events, so don't be surprised to find loads of action on the ham bands

at some wide-area sporting events. The 144 to 148 MHz ham band, also known as the 2-meter band, is the most popular, but the 440 to 450 and 222 to 225 MHz bands may also be used at some events. Repeaters in the 2-meter band can be found in the following ranges: 145.110 to 145.490 MHz and 146.400 to 147.390 MHz.

Typically, hams position themselves at checkpoints for events like road races or running marathons, transmitting reports to a central command post. In addition, hams may be used along the route of a race, both at stationary posts and in moving vehicles. They've also been known to transmit television signals over ham frequencies during some large-scale events: Cameras placed at certain vantage points provide a sort of "closed-circuit wireless TV system" that can be used for a non-profit event.

Hams will also provide medical safety communications at sporting events. Let's say a runner needs medical attention, there's a good chance a nearby ham will be able to relay the necessary information over a medical net set up for the event. Two marathons that involve a lot of amateur radio operators are the Boston and New York Marathons.

In one large event, the Register's Annual Great Bicycle Ride Across Iowa (RAGBRAI), hams ride on bikes and in vehicles along the ride's route and monitor the national calling frequency of 146.520 MHz to pass along emergency information. Other hams, who live along RAGBRAI's 400-plus-mile route across Iowa, also monitor the frequency to help relay reports from the ride, which attracts as many as 15,000 participants each July.



Amateur radio operators use their radios to lend support to large-scale sporting events by manning checkpoints. (Photo courtesy of American Radio Relay League.)

In addition to being a runner, Fred Doob, AA8FQ, is also a ham. He recently ran in the Los Angeles Marathon equipped with a handheld ham transceiver. He raised funds for a charity by making contacts with as many hams as possible during his run. (Photo courtesy of American Radio Relay League.)

Pro Sports on the Air

Most professional sports teams use two-way radios in one form or another. For needs ranging from stadium and arena security to coaching calls, most teams use at least one frequency. Each frequency may be designated for several functions. For instance, ushers may use the same frequency as security uses, but food concessions and coaches may have their own individual frequencies.

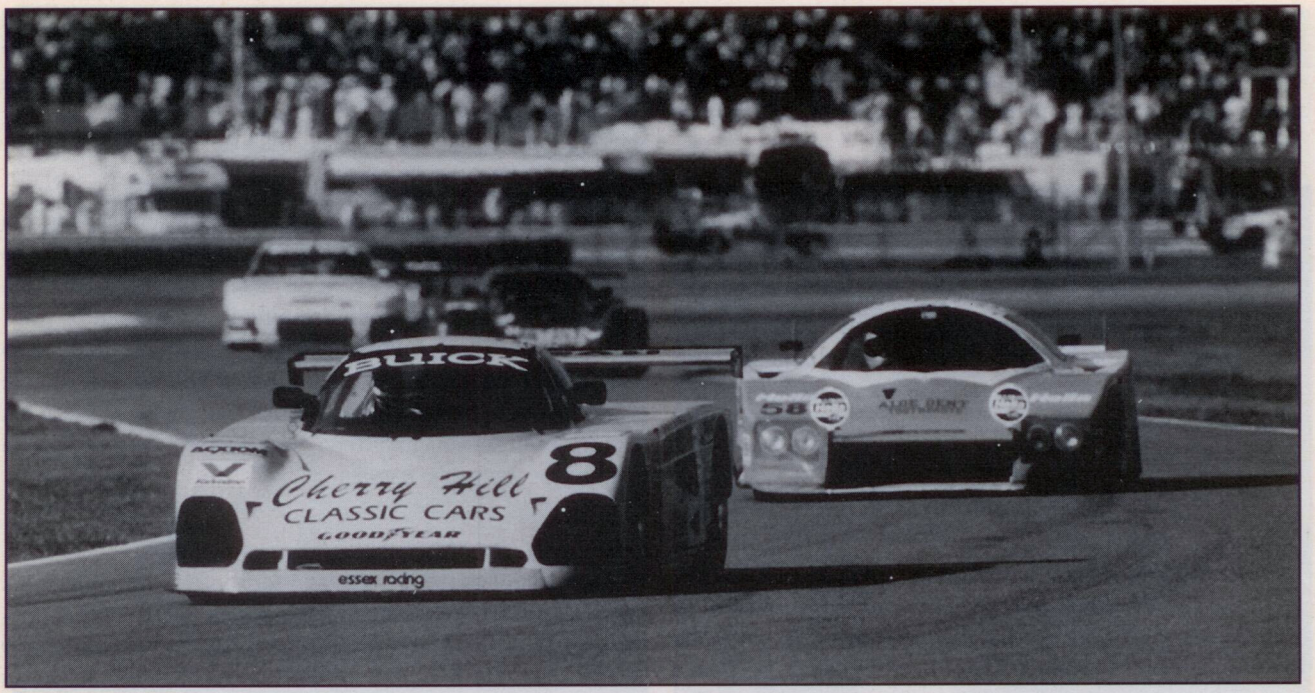
In football, radios may be used for team operations, but wireless microphones can also be tuned with a scanner. The next time you're watching a pro football game, take notice of the rubber duck antenna on the pack on the referee's back. You'll see him turn on a switch and announce a penalty, then turn the switch off again. While the switch is turned on, you'll hear his voice booming throughout the stadium from the wireless microphone. These are the actual frequencies you can tune in while sitting in the stands!

Road Racing Radios

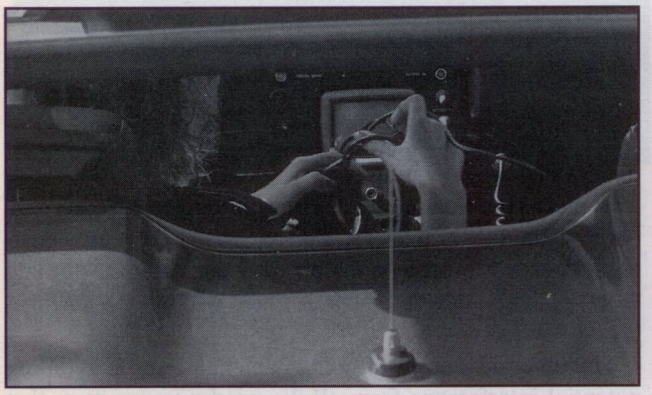
Auto racing is perhaps the biggest user of two-way radio. In addition to frequencies used by race coordinators, all the drivers use a radio to keep in touch with their crews. It's especially exciting to hear the winning driver radio his crew when he crosses the finish line, or to hear the commotion when an accident occurs three laps from the race's end.

Most race drivers use frequencies in the 461 to 465 and 466 to 470 MHz bands. Some crews even set up repeater systems to ensure communications from all corners of the track. While the driver isn't always transmitting to the crew (some drivers like to chat more than others), the crew usually keeps the driver apprised of his speed, the speed of competitors, and other information.

At any given major auto race, you'll find dozens of fre-



These International Motor Sports Association Camel Lights cars spin around a track and keep in touch with their crews with UHF radios.



The driver of a pace car at an auto race adjusts her two-way radio's headset prior to driving onto the track. The UHF antenna is mounted just behind the driver. (Photo by Chuck Gysi, N2DUP.)

A crew from ESPN conducts a track-side interview for on-air use. The news media also use two-way radios at sporting events. (Photo by Chuck Gysi, N2DUP.)

quencies used by drivers and their crews. In addition, sanctioning organizations, such as NASCAR and CART, have their own banks of frequencies you can tune. The same goes for race track crews, too. You'll also stumble across frequencies used by race promoters, sponsors, and concessions.

One terrific trick to help you keep track of what you hear at a race is to program your scanner using the channel numbers as the car numbers. For instance, if you find Arie Luyendyk, who drives car No. 28, operating on 465.2375 MHz, you would program that frequency into channel 28 of your scanner. That way, the next time your scanner stops on channel 28, you automatically know it's the frequency being used by car 28.

Many drivers also have a bank of frequencies they use for races. They may use one frequency for the week leading up to a race, including time trials, and then change their frequency literally minutes before the actual race. After all, drivers realize that the fans in the stands aren't the only ones listening—the competition may be listening, too!

While most racers use the 461 to 470 MHz band, the 851 to 866 and 935 to 940 MHz bands are gradually gaining in popularity, mainly to escape the congestion on the 461 to 470 MHz band. But, even if your handheld scanner doesn't receive the 800 or 900 MHz bands, you'll still find plenty to listen to on the 461 to 470 MHz band.

If you're interested in race communications, you should consider joining a club that caters to that aspect of scanning. Frequency Fan Club, for instance, publishes a monthly newsletter, "Race Scanning Monthly," that provides current frequencies used by drivers in all kinds of races, from Indy down to dirt tracks. Because the frequencies change quite often, it's a good idea for regular race scanner listeners to

subscribe to the newsletter. The club itself also uses a special frequency, known only to its subscribers, to broadcast up-to-date frequency information on the drivers at major races. You can contact them at P.O. Box 1987, Richmond Hill, GA 31324-1987, 800-RACE-FAN.

College Stations

College and university sporting events can attract as many spectators as pro sports. That means two-way radios are probably being used. The radios may be used by stadium operations personnel, coaches, the concessions, athletic trainers, and more. You'll probably find campus security or police using their routine frequencies at a major sporting event, too.

In the Arena

While a lot of stadium operations take place on business frequencies, those stadiums and arenas owned by city, county, or state governments may use police or local government frequencies. If city police provide security services at the stadium, they may be using a city police frequency, or even a police frequency designated just for the stadium. For instance, Giants Stadium in the New Jersey Meadowlands is owned by the state of New Jersey, and state police troopers patrol both inside and outside the stadium. A series of frequencies in the 800 MHz band that's allocated for public safety is used by the troopers.

In other stadiums, local government frequencies may be used. You may find that, rather than adding traffic to a frequency already in use for other municipal purposes, a local government has added a new frequency just for stadium operations. It might pay to go through your *Police Call* frequency directory (available from Radio Shack), noting the local government frequencies you know to be in use, and then try scanning all other frequencies the next time you're at the arena or stadium.

While most golf tournaments use two-way radios to coordinate personnel and players, many country clubs also use radios. Check country club listings in Beyond Police Call, *which is available at Radio Shack stores.*

Sports Scanning Etiquette

While listening to your scanner at a major sports event can provide loads of pleasure, it may not sit quite well with those who sit around you. To avoid disturbing others, use an earphone or headphones when listening to your scanner.

If you do disturb fellow fans, they'll probably ask you to turn off the noise. On the other hand, if you are considerate by using an earphone, those sitting near you may ask what you're doing—you may then find yourself turning *up* the volume so everyone can listen!

Take Off the Duck

One disadvantage of searching for sports communications while at an event is that you'll also hear other communications totally unrelated to what you want to monitor. For instance, if you're searching for team frequencies in a large city's stadium, you're most likely also picking up everything from taxicabs to trash haulers. That's just part of the challenge of the monitoring hobby.

The best way to reduce the number of businesses you can hear on your scanner is to take off your rubber duck antenna. That's right—remove the antenna from your scanner while attending a sporting event and you won't hear all those other citywide communications. All you'll hear are transmitters that are operating nearby, within your line-of-sight. That means if a walkie-talkie is transmitting on the other side of the stadium, you'll hear it. You may also hear nearby business repeaters located on towers near the stadium. But you won't pick up anywhere near as much without the antenna. It really works!

The other advantage to going "antenna-less" is avoiding potential interference from all the nearby transmitters that may be in use during the event. Because of the sheer number of transmitters and frequencies in use at, say, an auto race, you'll pick up a lot of interference as frequencies start mixing together inside your scanner. This sometimes causes the scanner to lock up on channels, receiving everything *except* what you want to hear. By taking off the rubber antenna, you'll eliminate the overload on your receiver and hear everything as it should be heard.

It's Your Play Now

If you want to give sports scanning a try, one of the best sources for frequencies is *Beyond Police Call*, a new scanner frequency directory available at Radio Shack. It details frequencies used by teams and sporting events in an easy format familiar to those who use the *Police Call* directories.

Or you can just dive right on in to the fray on your own. Wherever you travel, you're sure to encounter some sort of sports activity. Just remember to bring your scanner along—you'll get an earful!

If you just can't wait to get a seat right there on the bench, here's plenty of frequencies for popular summer sports to get you started.

AUTO RACING FREQUENCIES

FREQ	CALLSIGN	LICENSEE	LOCATION
936.6375	WNPJ875	USAC	SPEEDWAY IN
151.6250	KB91503	PENSKE SPEEDWAY	BROOKLYN MI
151.6250	KB91085	NORTHEASTERN MIDGET ASSN	
464.5500	KB79739	UNITED DRAG RACERS ASSN	ROCKFORD IL
151.6250	WNYJ774	BAY AREA COUNCIL OPEN LEAGUE RACING	
154.5700	KB51414	INTERNATIONAL RACE DRIVERS	KEYPORT WA
151.6250	KB72505	INTERNATIONAL DRAG BIKE ASSN	
151.6250	WNWQ721	KALAMAZOO SPEEDWAY	ALLEGAN MI
151.6250	WNGK704	ROCKFORD SPEEDWAY	ROCKFORD IL
151.6250	KB63709	RACING SUPPORT SERVICES	MILL VALLEY CA
151.6250	KA93126	BOOTHILL SPEEDWAY	SHREVEPORT LA
464.5000	WRO467	NASCAR RACING	FOREST PARK GA
469.5000	WRO467	NASCAR RACING	FOREST PARK GA
461.6250	WNWQ597	INTERNATIONAL MOTOR SPORT ASSN	
462.0250	WNWQ597	INTERNATIONAL MOTOR SPORT ASSN	
466.6250	WNWQ597	INTERNATIONAL MOTOR SPORT ASSN	
467.0250	WNWQ597	INTERNATIONAL MOTOR SPORT ASSN	
464.5000	WNWQ597	INTERNATIONAL MOTOR SPORT ASSN	
464.5500	WNWQ597	INTERNATIONAL MOTOR SPORT ASSN	
151.6250	WNCY950	MID OHIO SPORTS CAR COURSE	LEXINGTON OH
151.6250	WPCD888	MOTORCYCLE ROADRACING ASSN	
151.9250	WPCD888	MOTORCYCLE ROADRACING ASSN	
154.5150	WPAA797	EASTERN MOTOR RACING ASSN	
154.6000	WPCS245	SOUTHERN WISCONSIN DRAG RACING ASSN	
467.0625	WNZU391	HICKORY MOTOR SPEEDWAY	HICKORY NC
468.4625	WNZU391	HICKORY MOTOR SPEEDWAY	HICKORY NC
464.9000	WNZQ836	AUTOMOBILE RACING CLUB OF AMERICA	
469.7750	WNZQ836	AUTOMOBILE RACING CLUB OF AMERICA	
468.8500	WNZQ836	AUTOMOBILE RACING CLUB OF AMERICA	
464.7750	WNZQ836	AUTOMOBILE RACING CLUB OF AMERICA	
463.8500	WNZQ836	AUTOMOBILE RACING CLUB OF AMERICA	
464.5000	WNZQ836	AUTOMOBILE RACING CLUB OF AMERICA	
469.5000	WNZQ836	AUTOMOBILE RACING CLUB OF AMERICA	
151.6250	WNWK321	GREATER IOWA RACING	WEST UNION IA
151.6250	KIT558	LEBANON VALLEY SPEEDWAY	WEST LEBANON NY
464.6250	KA44115	CHAMPIONSHIP AUTO RACING TEAMS	
464.7500	KA44115	CHAMPIONSHIP AUTO RACING TEAMS	
464.9875	KA44115	CHAMPIONSHIP AUTO RACING TEAMS	
464.8875	KA44115	CHAMPIONSHIP AUTO RACING TEAMS	
154.5700	KA44115	CHAMPIONSHIP AUTO RACING TEAMS	
154.6000	KA44115	CHAMPIONSHIP AUTO RACING TEAMS	
469.5500	KA44115	CHAMPIONSHIP AUTO RACING TEAMS	
469.5000	KA44115	CHAMPIONSHIP AUTO RACING TEAMS	
464.5000	KA55079	RICHMOND INTERNATIONAL RACEWAY	RICHMOND VA
151.6250	KA20741	FLEMINGTON FAIR & CARNIVAL SPEEDWAY	FLEMINGTON NJ
464.5000	KD40588	COUNTY LINE SPEEDWAY	MEEKER OK
154.6000	KD42087	AMERICAN STOCK CAR RACING ASSN	LOUISVILLE KY
151.6250	KD41964	UNITED SPRINT CAR ASSN	DES MOINES IA
157.6650	WPDI437	STATE FAIR RACING ASSN	KANSAS CITY MO
151.6250	WNYW414	SOUTH TEXAS RACEWAY	SAN ANTONIO TX
151.8350	WNMS949	HOUSTON RACEWAY PARK	BAYTOWN TX
151.9250	WNUV336	ROSEBOWL RACEWAY	TYLER TX
154.6000	WNYW414	SOUTH TEXAS RACEWAY	SAN ANTONIO TX
462.1250	WNYL605	USAA	SAN ANTONIO TX
461.5750	WNYL605	USAA	SAN ANTONIO TX
154.5700	KD45844	OHIO VALLEY RACEWAY	LOUISVILLE KY
154.5700	KD26872	LOUISVILLE MOTOR SPEEDWAY	LOUISVILLE KY
154.6000	KD26872	LOUISVILLE MOTOR SPEEDWAY	LOUISVILLE KY
151.8050	KA78817	SPEEDWAYS	WICHITA KS
151.6250	KD44382	SPILLWAY SPEEDWAY	BELLE CHASE LA
461.9375	WPBI699	PIKE COUNTY SPEEDWAY	GONZALES LA
154.5700	KA64709	WASHINGTON MOTORCYCLE ROAD RACING	SEATTLE WA
467.7500	KD26498	TRI CITY RACEWAYS	KENNEWICK WA
467.8000	KD26498	TRI CITY RACEWAYS	KENNEWICK WA
151.6250	KL2369	BADGER MIDGET AUTO RACING	MCFARLAND WI
151.6550	KA73397	MIDWEST SPEEDWAYS	MILWAUKEE WI
154.5700	KA73209	GREAT LAKES DRAGAWAY	UNION GROVE WI
151.6850	KB91208	VIRGINIA RACEWAY PARK	LYNCHBURG VA
154.5400	KY2507	MARTINSVILLE SPEEDWAY	MARTINSVILLE VA
154.6000	KB91208	VIRGINIA RACEWAY PARK	LYNCHBURG VA
154.5150	KB91503	PENSKE SPEEDWAY	BROOKLYN MI
154.5400	KA68817	AUTOMOBILE RACING CLUB OF AMERICA	TOLEDO OH
154.5400	WNSL219	MICHIGAN IDEAL SPEEDWAY	SPRINGPORT MI
154.5700	KB65407	DRAGWAYS	WARREN MI
154.5700	KB91503	PENSKE SPEEDWAY	BROOKLYN MI
154.6000	KB91503	PENSKE SPEEDWAY	BROOKLYN MI
154.6000	WNSL219	MICHIGAN IDEAL SPEEDWAY	SPRINGPORT MI
461.4250	KWB699	UACC MIDWEST	GRAND RAPIDS MI

FREQ	CALLSIGN	LICENSEE	LOCATION
461.6250	KWB699	UACC MIDWEST	GRAND RAPIDS MI
461.7750	KWB699	UACC MIDWEST	GRAND RAPIDS MI
464.3250	WNYI898	MICHIGAN INTERNATIONAL RACEWAY	BROOKLYN MI
464.3750	WNYI898	MICHIGAN INTERNATIONAL RACEWAY	BROOKLYN MI
464.4750	WNYI898	MICHIGAN INTERNATIONAL RACEWAY	BROOKLYN MI
464.6500	WNYI898	MICHIGAN INTERNATIONAL RACEWAY	BROOKLYN MI
464.6750	WNQP765	TRI CITY MOTOR SPEEDWAY	AUBURN MI
464.7000	WNYI898	MICHIGAN INTERNATIONAL RACEWAY	BROOKLYN MI
464.8250	WNYI898	MICHIGAN INTERNATIONAL RACEWAY	BROOKLYN MI
461.3125	WPAH888	AUTO SPORTS UNLIMITED	ZEELAND MI
463.5625	WPAH888	AUTO SPORTS UNLIMITED	ZEELAND MI
154.5700	KWB699	UACC MIDWEST	DENVER CO
463.7250	WPBG751	BATTLE CREEK INTERNATIONAL RACEWAY	BATTLE CREEK MI
464.5750	WPBG751	BATTLE CREEK INTERNATIONAL RACEWAY	BATTLE CREEK MI
464.6750	WPBG751	BATTLE CREEK INTERNATIONAL RACEWAY	BATTLE CREEK MI
464.5000	WPBS715	UACC MIDWEST	DENVER CO
151.7450	KD45894	NORTH CENTRAL SPEEDWAY	ANOKA MN
151.8950	KYR402	BRAINERD INTERNATIONAL RACEWAY	MINNETONKA MN
154.5700	KA75928	VIKING SPEEDWAYS	ALEXANDRIA MN
464.3250	WYZ818	BRAINERD INTERNATIONAL RACEWAY	MINNETONKA MN
464.5250	WPDM726	BRAINERD INTERNATIONAL RACEWAY	MINNETONKA MN
151.6550	WNCW836	TRAILWAY SPEEDWAYS	HANOVER PA
151.6850	WNCW836	TRAILWAY SPEEDWAYS	HANOVER PA
151.7750	KB64560	LINCOLN SPEEDWAY	HANOVER PA
464.4250	WNHJ223	POCONO RACEWAY	LONG POND PA
464.6750	WNHK755	MCKEAN COUNTY FAIR STOCKCAR RACE	BRADFORD PA
464.9250	KNDG825	BIG DIAMOND RACEWAY	MINERSVILLE PA
469.8250	KB61994	ROGERS AND STINSON RACEWAY	BECHTELSVILLE PA
469.9375	WNWK911	GRANDVIEW SPEEDWAY	BECHTELSVILLE PA
154.6000	KD9911	MOUNTAIN VIEW RACING ASSN	GRANTVILLE PA
154.6000	WPDF520	BLUE MOUNTAIN QUARTER MIDGET RAC	WALNUTPORT PA
464.6250	KNDG825	BIG DIAMOND RACEWAY	MINERSVILLE PA
464.9250	KNDG825	BIG DIAMOND RACEWAY	MINERSVILLE PA
151.6250	KB80660	ALL PRO PULLERS MOTORSPORTS	ALLIANCE OH
151.7750	KVE255	NATIONAL TRAIL RACEWAY	GRANVILLE OH
154.5700	KA67960	NORWALK RACEWAY	NORWALK OH
154.5700	KB77066	TOLEDO SPEEDWAY	TOLEDO OH
154.5700	KB80660	ALL PRO PULLERS MOTORSPORTS	ALLIANCE OH
154.6000	KA67960	NORWALK RACEWAY	NORWALK OH
461.6375	KB69371	UNITED STATES AUTO CLUB	INDIANAPOLIS IN
461.6875	KB69371	UNITED STATES AUTO CLUB	INDIANAPOLIS IN
469.3250	WNFB329	NORTHFIELD RACE TRACK	NORTHFIELD OH
469.8250	WNFB329	NORTHFIELD RACE TRACK	NORTHFIELD OH
469.9250	WNFB329	NORTHFIELD RACE TRACK	NORTHFIELD OH
464.7750	WNFB329	NORTHFIELD RACE TRACK	NORTHFIELD OH
150.8600	WNSN355	ROCKFORD SPEEDWAY	ROCKFORD IL
151.6850	KA84013	SOUTHWESTERN AUTO RACING ASSN	NEW ATHENS IL
154.6000	KA77979	SHAHEEN SPEEDWAY	SPRINGFIELD IL
154.6000	KB89550	MACON SPEEDWAY	MACON IL
154.6000	KF6045	SYCAMORE SPEEDWAY	SYCAMORE IL
154.6000	KD38166	MOTORSPORTS AUTO RACING	BLUE ISLAND IL

MINOR LEAGUE BASEBALL FREQUENCIES

FREQ	CALLSIGN	LICENSEE	LOCATION
151.6250	KB78391	ARKANSAS TRAVELERS BASEBALL CLUB	LITTLE ROCK AR
151.6250	KB61561	ALBUQUERQUE PROFESSIONAL BASEBALL	ALBUQUERQUE NM
151.9250	WNXH722	CANTON AKRON INDIANS	CANTON OH
151.9550	WNXH722	CANTON AKRON INDIANS	CANTON OH
464.0125	WPAM542	CLINTON BASEBALL CLUB	CLINTON IA
464.0625	WPAM542	CLINTON BASEBALL CLUB	CLINTON IA
464.1375	WPAM542	CLINTON BASEBALL CLUB	CLINTON IA
465.8875	WPAM542	CLINTON BASEBALL CLUB	CLINTON IA
154.5400	WPDE534	SIOUX CITY BASEBALL CLUB	SIOUX CITY IA
154.5700	WPDE534	SIOUX CITY BASEBALL CLUB	SIOUX CITY IA
154.6000	WPDE534	SIOUX CITY BASEBALL CLUB	SIOUX CITY IA
154.6000		BURLINGTON BASEBALL ASSN (Bees)	BURLINGTON IA
151.7150	KNEP656	LOUISVILLE REDBIRDS	LOUISVILLE KY
464.8250	WNNT359	WICHITA BASEBALL	WICHITA KS
151.8650	WNFR766	SHREVEPORT BASEBALL	SHREVEPORT LA
461.6125	WPCN620	ROCKFORD ROYALS PRO BASEBALL	ROCKFORD IL
462.8625	WPCN620	ROCKFORD ROYALS PRO BASEBALL	ROCKFORD IL
463.4125	WPCN620	ROCKFORD ROYALS PRO BASEBALL	ROCKFORD IL
464.2375	WPCN620	ROCKFORD ROYALS PRO BASEBALL	ROCKFORD IL

MAJOR LEAGUE BASEBALL FREQUENCIES

FREQ	CALLSIGN	LICENSEE	LOCATION
936.6375	WNPP670	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
936.6625	WNPP670	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
897.6375	WNPP670	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
897.6625	WNPP670	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
151.6250	KST458	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI

FREQ	CALLSIGN	LICENSEE	LOCATION
151.9250	WNNA301	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
469.5000		MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
469.5500		MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
151.6250	WNWE272	NEW YORK METS BASEBALL	FLUSHING NY
151.8350		NEW YORK METS BASEBALL	FLUSHING NY
151.6250	KA65612	LOS ANGELES DODGERS (Media relations)	LOS ANGELES CA
151.7450		LOS ANGELES DODGERS	LOS ANGELES CA
154.5700		LOS ANGELES DODGERS	LOS ANGELES CA
464.5000	WNST448	LOS ANGELES DODGERS	LOS ANGELES CA
464.5500	WNST448	LOS ANGELES DODGERS	LOS ANGELES CA
464.3750	KVC918	ST LOUIS CARDINALS	SAINT LOUIS MO
464.6750		ST LOUIS CARDINALS	SAINT LOUIS MO
463.4500	KB33450	KANSAS CITY ROYALS BASEBALL CLUB	KANSAS CITY MO
464.8750	KB33450	KANSAS CITY ROYALS BASEBALL CLUB	KANSAS CITY MO
467.8250	KB33450	KANSAS CITY ROYALS BASEBALL CLUB	KANSAS CITY MO
463.7125	KM8822	TEXAS RANGERS BASEBALL	ARLINGTON TX
464.5375	KM8822	TEXAS RANGERS BASEBALL	ARLINGTON TX
464.1125	WPDN899	HOUSTON ASTROS BASEBALL CLUB	HOUSTON TX
935.1750	WNQL587	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
935.2000	WNQL587	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
935.2500	WNQL587	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
935.6875	WNQL587	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
151.8050	KST458	MILWAUKEE BREWERS BASEBALL CLUB	MILWAUKEE WI
466.1875	WPCS517	DETROIT TIGERS	DETROIT MI
466.8500	WPCS517	DETROIT TIGERS	DETROIT MI
461.2500	WNKR952	MINNESOTA TWINS BASEBALL CLUB	MINNEAPOLIS MN
464.5750	WNLJ437	MINNESOTA TWINS BASEBALL TEAM	MINNEAPOLIS MN
464.7750	WNLJ437	MINNESOTA TWINS BASEBALL TEAM	MINNEAPOLIS MN
154.5150	KB61638	CLEVELAND INDIANS BASEBALL CLUB	CLEVELAND OH
462.2125	KB37453	CINCINNATI REDS	CINCINNATI OH
462.8625	KB88468	CINCINNATI REDS	CINCINNATI OH
462.1750		CINCINNATI REDS	CINCINNATI OH
151.6250	KA93479	CHICAGO WHITE SOX	CHICAGO IL
151.6850	KD25775	CHICAGO WHITE SOX	CHICAGO IL
151.8350	WNPQ724	CHICAGO WHITE SOX	CHICAGO IL
461.1625	WNUA891	CHICAGO WHITE SOX	CHICAGO IL
462.8125	WNPQ724	CHICAGO WHITE SOX (Food concessions)	CHICAGO IL
463.5875	KA94018	CHICAGO CUBS	CHICAGO IL
464.5875	KA94018	CHICAGO CUBS (Security)	CHICAGO IL
464.7500	WNPQ724	CHICAGO WHITE SOX (Stadium operations)	CHICAGO IL
469.3125	KB86791	CHICAGO CUBS	CHICAGO IL
461.2000	WNZT533	CHICAGO WHITE SOX	CHICAGO IL
464.3250		ATLANTA BRAVES	ATLANTA GA
464.4375		BALTIMORE ORIOLES	BALTIMORE MD
463.3250		BOSTON RED SOX (Security)	BOSTON MA
464.0750		BOSTON RED SOX (Security)	BOSTON MA
463.3625		BOSTON RED SOX (Stadium operations)	BOSTON MA
463.4125		BOSTON RED SOX (Media coordination)	BOSTON MA
461.9250		CALIFORNIA ANGELS (Ushers)	ANAHEIM CA
151.6250		NEW YORK YANKEES	BRONX NY
464.3750		OAKLAND ATHLETICS (Security)	OAKLAND CA
464.4750		OAKLAND ATHLETICS (Food service)	OAKLAND CA
154.5700		PHILADELPHIA PHILLIES (Ushers, security)	PHILADELPHIA PA
151.6250		PITTSBURGH PIRATES	PITTSBURGH PA
467.8500		PITTSBURGH PIRATES	PITTSBURGH PA
467.7625		PITTSBURGH PIRATES	PITTSBURGH PA
467.7500		PITTSBURGH PIRATES	PITTSBURGH PA
467.9250		PITTSBURGH PIRATES	PITTSBURGH PA
464.5500	KB81402	SAN FRANCISCO GIANTS	SAN FRANCISCO CA
936.6375	WNRN966	SAN FRANCISCO GIANTS	SAN FRANCISCO CA
936.6625	WNRN966	SAN FRANCISCO GIANTS	SAN FRANCISCO CA
462.5500		SEATTLE MARINERS	SEATTLE WA
462.6000		SEATTLE MARINERS	SEATTLE WA
182.3000		SEATTLE MARINERS (Wireless microphones)	SEATTLE WA
464.5375		TEXAS RANGERS (Security)	ARLINGTON TX
463.7125		TEXAS RANGERS	ARLINGTON TX
464.5625		TEXAS RANGERS (Parking)	ARLINGTON TX

GOODYEAR BLIMP FREQUENCIES

FREQ	USE	LOCATION
123.0500	COMMON BLIMP PORT	
123.2500	WINGFOOT LAKE FACILITY	SUFFIELD OH
132.0000	GOODYEAR TIRE & RUBBER CO. CHANNEL	
151.6250	IN-FLIGHT OPERATIONS AT SPORTING EVENTS	
465.9125	IN-FLIGHT OPERATIONS AT SPORTING EVENTS	
465.9375	IN-FLIGHT OPERATIONS AT SPORTING EVENTS	
465.9625	IN-FLIGHT OPERATIONS AT SPORTING EVENTS	

DOG RACING FREQUENCIES

FREQ	CALLSIGN	LICENSEE	LOCATION
463.2750	WNFV831	DUBUQUE GREYHOUND PARK	DUBUQUE IA
463.6500	KD26912	DUBUQUE GREYHOUND PARK	DUBUQUE IA
464.7750	WNDX204	IOWA WEST GREYHOUND PARK	COUNCIL BLUFFS IA
461.9250	WNVJ397	CORPUS CHRISTI GREYHOUND TRACK	CORPUS CHRISTI TX
464.9750	WNXT376	VALLEY GREYHOUND PARK	HARLINGEN TX
466.1375	WPAT415	GULF GREYHOUND PARK	LA MARQUE TX
461.1375	WPAT415	GULF GREYHOUND PARK	LA MARQUE TX
464.2875	WPAT415	GULF GREYHOUND PARK	LA MARQUE TX
464.6375	WPAT415	GULF GREYHOUND PARK	LA MARQUE TX
464.9875	WPAT415	GULF GREYHOUND PARK	LA MARQUE TX
157.6650	WNRU468	WISCONSIN DELLS GREYHOUND RACING	WISCONSIN DELLS WI
154.5150	WNSL425	VALLEY GREYHOUND PARK	KAUKAUNA WI
157.6350	WNSL424	VALLEY GREYHOUND PARK	KAUKAUNA WI
464.6000	WNUX228	DAIRYLAND GREYHOUND PARK	KENOSHA WI

HORSE RACING FREQUENCIES

FREQ	CALLSIGN	LICENSEE	LOCATION
461.1625	KD42421	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
461.1875	KD42421	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
461.2125	KD42421	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
461.2625	KD42421	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA**F**
461.3375	KD42421	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
461.3625	KD42421	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
461.4125	KD42421	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
461.8500	WNPA488	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
461.8500	WNPD203	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
463.3750	WNPA488	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
464.2000	WNPD203	PRAIRIE MEADOWS RACE TRACK	ALTOONA IA
151.6550	WNUH609	BANDERA DOWNS	BANDERA TX
151.6850	WNUH609	BANDERA DOWNS	BANDERA TX
154.5700	WNUI908	LAS COLINAS EQUESTRIAN	IRVING TX
154.6000	WNUI908	LAS COLINAS EQUESTRIAN	IRVING TX
461.1375	WPDN333	SAM HOUSTON RACE PARK LTD	HOUSTON TX
461.3125	WPDN333	SAM HOUSTON RACE PARK LTD	HOUSTON TX
461.5125	WPDN333	SAM HOUSTON RACE PARK LTD	HOUSTON TX
461.5625	WPDN333	SAM HOUSTON RACE PARK LTD	HOUSTON TX
461.9125	WPDN333	SAM HOUSTON RACE PARK LTD	HOUSTON TX
462.9125	WPDN333	SAM HOUSTON RACE PARK LTD	HOUSTON TX
464.6375	WPDN333	SAM HOUSTON RACE PARK LTD	HOUSTON TX
464.8375	WPDN333	SAM HOUSTON RACE PARK LTD	HOUSTON TX
151.6250	KE8760	LOUISVILLE DOWNS	LOUISVILLE KY
461.0750	KA78485	KENTUCKY JOCKEY CLUB	FLORENCE KY
461.8875	KS8026	CHURCHILL DOWNSORPORATED	LOUISVILLE KY
462.7875	KS8026	CHURCHILL DOWNSORPORATED	LOUISVILLE KY
463.4625	KS8026	CHURCHILL DOWNSORPORATED	LOUISVILLE KY
463.7125	KNHG535	CALUMET FARM	LEXINGTON KY
463.7750	KNHG535	CALUMET FARM	LEXINGTON KY
464.0375	KS8026	CHURCHILL DOWNSORPORATED	LOUISVILLE KY
464.1875	KS8026	CHURCHILL DOWNSORPORATED	LOUISVILLE KY
464.5500	KB95992	BLUE GRASS DOWNS	PADUCAH KY
464.7625	KS8026	CHURCHILL DOWNSORPORATED	LOUISVILLE KY
464.8250	WNAR480	LOUISVILLE DOWNS	LOUISVILLE KY
469.8000	WPBV788	TURFWAY PARK RACING	FLORENCE KY
469.8250	WPBV788	TURFWAY PARK RACING	FLORENCE KY
469.9000	WPBV788	TURFWAY PARK RACING	FLORENCE KY
469.9250	WPBV788	TURFWAY PARK RACING	FLORENCE KY
151.9250	KNAH964	DELTA DOWNS	VINTON LA
154.6000	KB75280	JEFFERSON DOWNS	KENNER LA
464.0500	WRF737	LOUISIANA DOWNS	BOSSIER CITY LA
464.1000	WRF737	LOUISIANA DOWNS	BOSSIER CITY LA
464.3500	WQD277	JEFFERSON DOWNS	KENNER LA
464.8750	KML806	JEFFERSON DOWNS	KENNER LA
464.8750	WST307	LOUISIANA DOWNS	BOSSIER CITY LA
463.2500	WNKK825	U P HARNESS RACING	ESCANABA MI
463.9375	KB69480	DETROIT RACE COURSE	LIVONIA MI
468.9875	KB69480	DETROIT RACE COURSE	LIVONIA MI
461.1625	KB67457	MINNESOTA RACETRACK	SHAKOPEE MN
461.1625	WNSX655	LADBROKE RACING CANTERBURY	SHAKOPEE MN
461.1875	KB67457	MINNESOTA RACETRACK	SHAKOPEE MN
461.1875	WNSX655	LADBROKE RACING CANTERBURY	SHAKOPEE MN
461.2125	KB67457	MINNESOTA RACETRACK	SHAKOPEE MN
461.2125	WNSX655	LADBROKE RACING CANTERBURY	SHAKOPEE MN
461.2625	KB67457	MINNESOTA RACETRACK	SHAKOPEE MN
461.2625	WNSX655	LADBROKE RACING CANTERBURY	SHAKOPEE MN
461.2875	KB67457	MINNESOTA RACETRACK	SHAKOPEE MN
461.2875	WNSX655	LADBROKE RACING CANTERBURY	SHAKOPEE MN
461.3125	KB67457	MINNESOTA RACETRACK	SHAKOPEE MN

FREQ	CALLSIGN	LICENSEE	LOCATION
461.3125	WNSX655	LADBROKE RACING CANTERBURY	SHAKOPEE MN
461.3375	KB67457	MINNESOTA RACETRACK	SHAKOPEE MN
461.3375	WNSX655	LADBROKE RACING CANTERBURY	SHAKOPEE MN
461.3625	KB67457	MINNESOTA RACETRACK	SHAKOPEE MN
461.3625	WNSX655	LADBROKE RACING CANTERBURY	SHAKOPEE MN
463.8000	KKP847	PENNSYLVANIA NATIONAL RACE TRACK	GRANTVILLE PA
463.8750	WPAQ864	POCONO DOWNS	WILKES-BARRE PA
464.2500	WPAQ864	POCONO DOWNS	WILKES-BARRE PA
464.3750	WPBM380	PENN NATIONAL O T W	READING PA
464.5500	WPBM380	PENN NATIONAL O T W	READING PA
464.9250	WNKR984	PENNSYLVANIA NATIONAL RACE TRACK	HARRISBURG PA
151.6550	KDK682	WASHINGTON TROTTING ASSN	MEADOW LAKES PA
151.8650	KDK682	WASHINGTON TROTTING ASSN	MEADOW LAKES PA
462.8625	KDK682	WASHINGTON TROTTING ASSN	MEADOW LAKES PA
463.3875	KDK682	WASHINGTON TROTTING ASSN	MEADOW LAKES PA
468.8625	KDK682	WASHINGTON TROTTING ASSN	MEADOW LAKES PA
151.7750	KBB770	BEULAH PARK JOCKEY CLUB	GROVE CITY OH
151.8050	KBB770	BEULAH PARK JOCKEY CLUB	GROVE CITY OH
151.8350	KBB770	BEULAH PARK JOCKEY CLUB	GROVE CITY OH
154.6000	KA55464	LEBANON TROTTING CLUB	LEBANON OH
463.8750	WNPQ434	SCIOTO DOWNS	COLUMBUS OH
464.5500	KD45014	SCIOTO DOWNS	COLUMBUS OH
464.3250	WPAI377	NORWALK RACEWAY PARK	NORWALK OH
462.1750	WNQN708	ARLINGTON INTERNATIONAL RACECOURSE	ARLINGTON HEIGHTS IL
463.9250	WNNY474	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.2750	KB91791	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.3250	WNNI226	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.3500	WNNI226	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.4250	WNNI226	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.4750	WQH523	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.5750	WNNI226	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.6000	WNNY474	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.6250	KB91791	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.8000	KB91791	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.9000	WNNY474	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
464.9250	KB92570	MAYWOOD PARK TROTTING	MAYWOOD IL
464.9250	KZU769	SPORTSMANS PARK	CICERO IL
464.9750	WQH523	ARLINGTON PARK RACE TRACK CORP	ARLINGTON HEIGHTS IL
466.4875	KB72641	NATIONAL JOCKEY CLUB	CICERO IL
469.3750	KD22609	HAWTHORNE RACE COURSE	CICERO IL
151.6250	WNVQ759	KENTUCKY HORSE PARK	LEXINGTON KY
464.5500	KRL694	DOVER DOWNS	DOVER DE
469.5500	KRL694	DOVER DOWNS	DOVER DE

RUNNING FREQUENCIES

FREQ	CALLSIGN	USE	LOCATION
147.1500		NEW YORK MARATHON (Medical net)	NEW YORK NY
147.1950		NEW YORK MARATHON (Runner dropout net)	NEW YORK NY
145.2300		NEW YORK MARATHON (Logistics net - south)	NEW YORK NY
462.1000		NEW YORK ROADRUNNERS	NEW YORK NY
461.2500	WNPB927	CRESENT CITY CLASSIC 10K	NEW ORLEANS LA

SPORTS STADIUMS AND ARENAS

FREQ	CALLSIGN	LICENSEE	LOCATION
936.6375	WNRN966	CALIFORNIA STADIUM SERVICES Candlestick	SAN FRANCISCO CA
936.6625	WNRN966	CALIFORNIA STADIUM SERVICES Candlestick	SAN FRANCISCO CA
464.5500	WNGR739	SPECTATOR SYSTEMS	VIENNA VA
469.5500	WNGR739	SPECTATOR SYSTEMS	VIENNA VA
469.5000	WNGR739	SPECTATOR SYSTEMS	VIENNA VA
151.6250	KNIX860	HARRY M STEVENS	HOUSTON TX
151.6250	KNIX860	HARRY M STEVENS	HOUSTON TX
151.6250	WNMB902	HARRY M STEVENS	HOUSTON TX
151.6250	WNMB902	HARRY M STEVENS	HOUSTON TX
464.5000	WNMB902	HARRY M STEVENS	HOUSTON TX
464.5000	KD44082	HOLIDAY INN SPORTS COMPLEX	KANSAS CITY MO
151.9250	KNIX860	HARRY M STEVENS	HOUSTON TX
154.6000	KD41137	ARA SERVICES	HOUSTON TX
463.9625	KB93695	FREEMAN COLISEUM	SAN ANTONIO TX
464.1125	KB93695	FREEMAN COLISEUM	SAN ANTONIO TX
464.5625	KB90998	ARA LEISURE SERVICES	ARLINGTON TX
464.6750	WNUT658	HARRY M STEVENS	HOUSTON TX
154.5700	WPAQ749	SCURRY COUNTY COLISEUM	SNYDER TX
461.1375	KD39080	ASTRODOME USA	HOUSTON TX
461.7125	KD51448	ASTRODOME USA	HOUSTON TX
461.7375	KD51448	ASTRODOME USA	HOUSTON TX
462.1375	KD39080	ASTRODOME USA	HOUSTON TX
463.8375	KD51448	ASTRODOME USA	HOUSTON TX
463.9375	KD51448	ASTRODOME USA	HOUSTON TX
464.4125	KD37490	ASTRODOME USA	HOUSTON TX
464.9375	KB72984	ASTRODOME USA	HOUSTON TX
461.9500	WPDS755	ASTRODOME USA	HOUSTON TX
462.0250	WPDS755	ASTRODOME USA	HOUSTON TX

FREQ	CALLSIGN	LICENSEE	LOCATION
463.3000	WPDS755	ASTRODOME USA	HOUSTON TX
462.0750	KNFC470	ASTRODOME USA	HOUSTON TX
464.6750	WNSX771	ELLIS RACE & ENTERTAINMENT CTR	HENDERSON KY
151.8650	WRN300	PARKLAND SPORT CENTER	TACOMA WA
467.7625	WPDM595	NATIONAL ICE TRAINING CENTER	MILWAUKEE WI
467.8125	WPDM595	NATIONAL ICE TRAINING CENTER	MILWAUKEE WI
467.8625	WPDM595	NATIONAL ICE TRAINING CENTER	MILWAUKEE WI
467.9125	WPDM595	NATIONAL ICE TRAINING CENTER	MILWAUKEE WI
464.4500	KD30694	FAIRFAX ICE ARENA	FAIRFAX VA
151.6250	WNWF693	TAGS SPORTS COMPLEX	HARTLAND MI
151.8350	KNFP802	WING STADIUM MANAGEMENT	KALAMAZOO MI
462.1625	KR3085	PONTIAC STADIUM AUTHORITY	PONTIAC MI
464.7750	WNXP429	RIVERSIDE ARENA	LIVONIA MI
466.8125	KB75807	OLYMPIA ARENAS	DETROIT MI
467.0375	KB75807	OLYMPIA ARENAS	DETROIT MI
467.8375	KD28955	ARENA ASSOCIATES	ROCHESTER MI
467.8625	KD28955	ARENA ASSOCIATES	ROCHESTER MI
467.8875	KD28955	ARENA ASSOCIATES	ROCHESTER MI
151.6550	WPAY827	WING STADIUM MANAGEMENT	KALAMAZOO MI
151.9550	WPAY827	WING STADIUM MANAGEMENT	KALAMAZOO MI
469.3250	KD23480	CIVIC ARENA MANAGEMENT CORP	MUSKEGON MI
154.5700	KS6994	METROPOLITAN SPORTS CENTER	MINNEAPOLIS MN
154.6000	KB53543	SAINT PAUL CIVIC CENTER	SAINT PAUL MN
461.1875	WNSI200	MINNESOTA ARENA LP	MINNEAPOLIS MN
461.2625	WNSI200	MINNESOTA ARENA LP	MINNEAPOLIS MN
461.3375	WNSI200	MINNESOTA ARENA LP	MINNEAPOLIS MN
462.1500	WNSI200	MINNESOTA ARENA LP	MINNEAPOLIS MN
464.3625	WNSI200	MINNESOTA ARENA LP	MINNEAPOLIS MN
464.5875	WNSI200	MINNESOTA ARENA LP	MINNEAPOLIS MN
466.3625	WNSI200	MINNESOTA ARENA LP	MINNEAPOLIS MN
464.3250	WPCR339	NATIONAL SPORTS CENTER	BLAINE MN
464.4750	WPCR339	NATIONAL SPORTS CENTER	BLAINE MN
461.1125	WNSW652	CIVIC ARENA FOOD SERVICE CORP	PITTSBURGH PA
464.2750	WNGM659	SPECTRUM	PHILADELPHIA PA
464.5250	KD52925	CIVIC ARENA CORP	PITTSBURGH PA
464.9500	KNFX871	SPECTRUM	PHILADELPHIA PA
154.5700	WPAK370	APPALACHIAN SPORTS CENTER	HARRISBURG PA
463.3125	WPCA706	CIVIC ARENA CORP	PITTSBURGH PA
463.7875	WPCA706	CIVIC ARENA CORP	PITTSBURGH PA
154.6000	WPDB814	SPORTLAND	ERIE PA
151.6550	KA73390	UNIVERSITY OF DAYTON ARENA	DAYTON OH
154.5700	KT5117	CLEVELAND STADIUM CORP	CLEVELAND OH
154.6000	KB22300	SPORTS ARENA	TOLEDO OH
469.9750	KA90021	CINCINNATI COLISEUM CO	CINCINNATI OH
464.6125	KD22140	CAVS COLISEUM MANAGEMENT COMPANY	RICHFIELD OH
469.9250	WPDP278	OGDEN SERVICES	CINCINNATI OH
464.5250	WPDM399	SPECTACOR MANAGEMENT GROUP	PEORIA IL
464.9750	WPDM399	SPECTACOR MANAGEMENT GROUP	PEORIA IL

Sports Scanning Glossary

MHz—megahertz, or 1,000 kilohertz. Scanner frequencies usually are expressed in megahertz, such as 151.625 MHz.

Business radio—two-way radio frequencies used by businesses, schools and churches in the VHF and UHF bands.

VHF low band—typically those frequencies between 30 and 50 megahertz on scanners.

VHF high band—typically those frequencies between 137 and 174 MHz on scanners.

UHF—typically those frequencies between 406 and 520 megahertz on scanners, but technically can refer to all frequencies between 300 and 3,000 megahertz.

800 MHz—those frequencies between 800 and 900 megahertz, typically the 851 to 869 megahertz business and public safety channels and the 869 to 894 megahertz cellular band.

900 MHz—those frequencies between 900 and 1,000 megahertz (or 1 gigahertz), but typically refers to the 902 to 928 megahertz amateur band, the 929 to 930 and 931 to 932 megahertz paging band, and the 935 to 940 megahertz business band.

Itinerant business—those businesses that have a tendency to move from one area to another, never staying in one particular location for more than a year. Itinerant businesses can license themselves on the following frequencies: 27.49, 35.04, 151.625, 464.500, 464.550, 469.500 and 469.550. These are good frequencies to catch sports action.

Repeater—a combination receiver and transmitter that retransmits communications from one frequency onto another. This allows wide-area coverage for mobile and handheld radios because their signal is retransmitted to all others from the repeater site.

kilohertz—1,000 hertz, 1,000 kilohertz equals 1 megahertz.

Special emergency—a radio service created for ambulances, rescue squads, lifeguards, school buses, veterinarians, hospitals, ski patrols and other allied services.

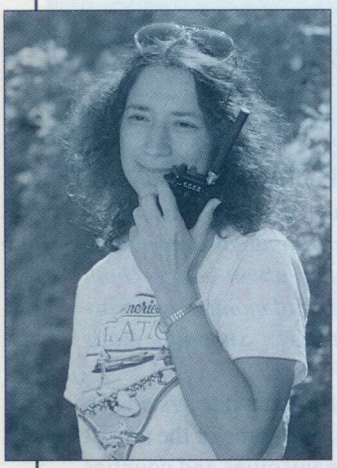
2-meter band—refers to the wavelength of a radio signal at the 144-148 megahertz amateur radio band.

Net—an organized gathering of amateur radio operators on a specific radio frequency. Nets are typically organized to relay or deliver information or messages.

Local government frequencies—channels used by local (city or municipal), county and state governments to perform their various services. These frequencies can be found in all scanner bands. ■

One Size Fits All!

Amateur Radio

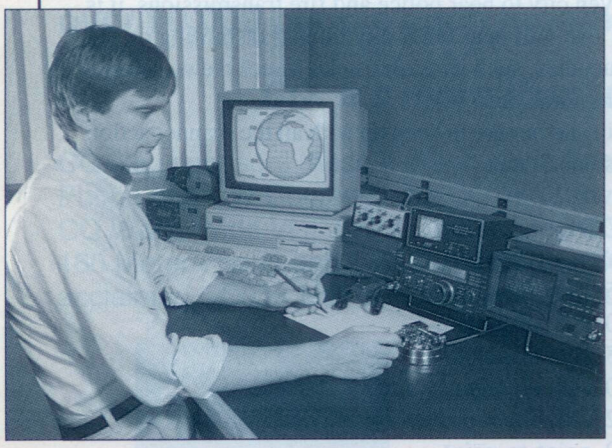


If you want to get in on the fun and excitement of personal radio communications—from talking to friends across town, to making new friends in dozens of foreign countries—Amateur Radio is for you!

More than two million people around the world share a fascination with the diversity and friendships Amateur Radio brings to their lives. Amateur Radio is a multifaceted method of communication that fits every lifestyle.

Who are these Amateur Radio enthusiasts? Kings, country western singing stars, senior citizens, astronauts, school children, mechanics and homemakers, to name just a few. Anyone can enjoy Amateur Radio, regardless of age, gender, occupation or physical ability.

The best part about Amateur Radio is that there are so many activities to explore—finding your perfect fit is half of the fun. You can operate a two-way radio station from your easy-chair, computer, car, boar, camper or even from a mountaintop! It's two-way mobility with a capital "M."



Amateur Radio is fun and convenient—and it's great for emergencies. You can talk to other hams (Amateur Radio operators) across town, across the globe and even beyond. Ever imagine talking to an astronaut in orbit or bouncing a signal off the moon and back? Amateur Radio operators do it every day—and you can, too.

Finding out how you can get started in ham radio couldn't be easier. We're the American Radio Relay League, the largest Amateur Radio membership organization in the country, and we've been helping hams (and future hams) get started for more than 75 years. We'll help you, too.

A great way to get more acquainted with Amateur Radio, or enhance your ham radio enjoyment if you're already licensed, is membership in the ARRL. In addition to invaluable services, benefits and access to dozens of specialized ham radio books, each month you'll receive your membership journal, *QST*. Weighing in at more than 200 pages per issue, *QST* is packed with Amateur Radio news, features, operating tips, technical advice *and* a very special section for beginners: *New Ham Companion*. You'll get the whole picture—everything that's going on in the amateur community, and you'll be able to take advantage of everything Amateur Radio has to offer.

Getting Started Now:
Two Roads to Success

Getting started in Amateur Radio is as simple as calling the toll-free number shown below.

The easiest way to get the "ball rolling" is to ask for our free "Getting Started in Amateur Radio" package. Included is all the information you need to find out about how you can get on the air with your own ham radio station.

If you're already a ham—or think that you want to be!—call the toll-free number and sign up for a 1-year ARRL Membership. Membership in the American Radio Relay League—the national organization of Amateur Radio operators—is an invaluable help in getting a good start in ham radio. As an ARRL Member, you'll expand your Amateur Radio horizons with expert information on virtually every Amateur Radio topic and enjoy membership services tailored to your needs as a new ham.

So, what are you waiting for? Call today. The fascinating world of Amateur Radio awaits!

Call 1-800-32-NEWHAM

AMERICAN RADIO RELAY LEAGUE ■ 225 MAIN STREET ■ NEWINGTON, CT 06111-1494
203-666-1541 (voice) ■ 203-665-7531 (fax)

Florida: A Summer Tune

The Sunshine State has plenty of scanning excitement for residents and visitors alike.

By Chuck Gysi, N2DUP

Wherever you travel with your scanner in the U.S., you'll be able to count on Radio! *magazine for the latest frequencies to hear all the action. Each issue, be sure to look for our featured geographical area where you'll find frequencies and information about police, (both local and state), fire, medical, and special monitoring information including major amusement parks, shopping malls and much more!*

Here's a list of active frequencies for statewide systems in Florida, its larger cities and counties, and some of the tourist attractions. It should be noted that many cities and counties in Florida are gradually switching over to 800 MHz trunked radio systems. If you monitor the 800 MHz frequencies listed for a given city to hear police and fire transmissions, it is likely you also will hear other city units transmitting on the same frequencies, such as trash trucks, street crews, animal control personnel, etc.

So tune in and be sure to keep up with all the scanner action in the Sunshine State.

STATEWIDE

Florida Highway Patrol:

154.665, F-1, dispatch
154.680, F-2, dispatch
154.695, F-3, dispatch
154.920, F-4, emergency and car to car
465.1625, mobile repeaters for handheld radios
155.370, point-to-point

Florida Turnpike:

453.575, F-1, Florida Highway Patrol dispatch
453.625, F-2, Florida Highway Patrol dispatch backup
453.675, F-3, maintenance and service plazas, primary
453.725, F-4, maintenance and service plazas, secondary
156.180, mobile repeaters for handheld radios

Don't forget to search the active VHF marine frequencies between 156 and 162 MHz in Florida. The Everglades are one VHF marine hot spot in the Sunshine State.

Statewide Shared Emergency Frequencies:
- 45.86, law enforcement emergency
- 154.950, law enforcement emergency
- 460.275, law enforcement emergency
- 154.265, fire mutual aid, "red"
- 154.280, fire mutual aid, "white"
- 154.295, fire mutual aid, "blue"
- 155.340, ambulance mutual aid
- 463.175, paramedic coordination
- 853.3875, public safety, ambulance mutual aid
- 866.0125, public safety tactical, F-1
- 866.5125, public safety tactical, F-2
- 867.0125, public safety tactical, F-3
- 867.5125, public safety tactical, F-4
- 868.0125, public safety tactical, F-5

Department of Transportation:
- 47.14, highways
- 47.26, highways
- 44.90, truck weight enforcement
- 45.06, truck weight enforcement

Division of Forestry:
- 159.240, base to mobile
- 159.270, mobile to base
- 159.300, base to base
- 159.330, mobile to mobile
- 159.375, fire watch towers

Game and Fresh Water Fish Commission:
- 151.385, F-1, primary, base to mobile
- 151.160, F-1, primary, mobile to base
- 151.310, F-2, mobile to mobile

Recreation and Parks:
- 44.76, rangers

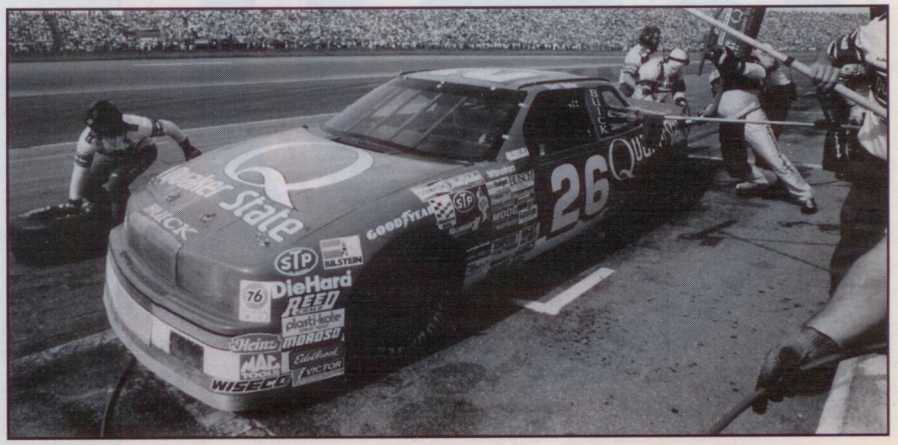
Bureau of Emergency Management:
- 39.18, F-1, primary
- 39.10, F-2, secondary

Marine Patrol:
- 44.90, F-1, dispatch
- 45.00, F-2, dispatch, base to car
- 44.90, F-2, dispatch, car to base
- 44.80, F-3, dispatch, Tampa Bay area
- 45.06, F-4, mutual aid
- 44.00, F-5, dispatch
- 44.76, F-6, mobile to mobile

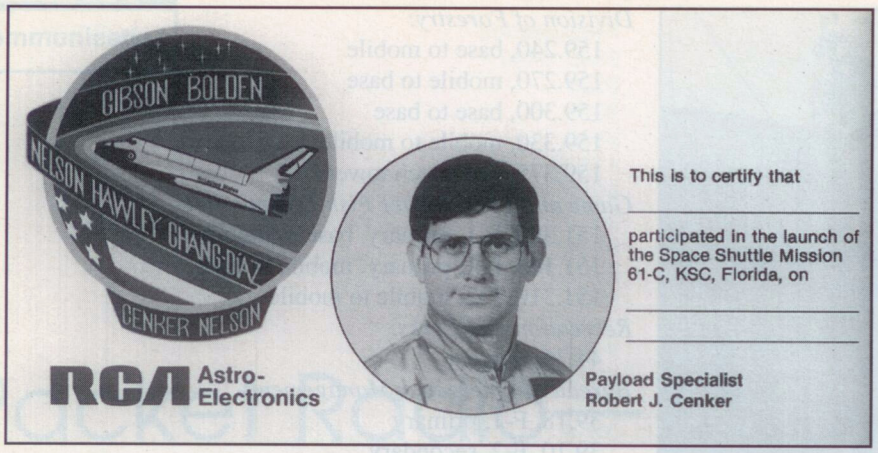
Florida Inland Waterways:
- 158.865, dispatch

National Parks and Forests:
- 164.825, Apalachicola National Forest
- 168.675, Ocala National Forest
- 164.825, Ocala National Forest
- 169.175, Ocala National Forest
- 169.900, Ocala National Forest
- 164.825, Osceola National Forest
- 172.425, Big Cypress National Preserve
- 172.675, Biscayne National Park
- 164.750, Canaveral National Seashore (also 164.625)
- 172.525, Everglades National Park (also 172.775)
- 171.525, Gulf Islands National Seashore
- 171.725, Gulf Islands National Seashore
- 172.525, Gulf Islands National Seashore
- 164.750, Merritt Island National Park

REACT Teams:
- 462.675, Clearwater, Daytona Beach, St. Petersburg
- 462.575, Hialeah
- 462.600, Floral City



NASCAR racing is one of the primary attractions at Daytona Beach. Be sure to take along a handheld scanner to catch all the NASCAR action, as well as frequencies used by all the drivers in the UHF and 800 MHz bands.


GIBSON BOLDEN
NELSON HAWLEY CHANG-DIAZ
CENKER NELSON
RCA Astro-Electronics
This is to certify that
participated in the launch of the Space Shuttle Mission 61-C, KSC, Florida, on
Payload Specialist
Robert J. Cenker

This card was given to official space flight participants by RCA Astro-Electronics several years ago.

With your scanner at Kennedy Space Center, tune in 173.6875 and you might hear security officers escorting astronauts to their shuttle. (Photo courtesy of NASA)

FORT MYERS

Trunked system for city police and Lee County sheriff:

856.2125	857.9875	859.7375
856.2375	858.2125	859.9875
856.4625	858.2375	860.2125
856.7375	858.4625	860.2375
856.9875	858.7375	860.4625
857.2125	858.9875	860.7375
857.2375	859.2125	860.9875
857.4625	859.2375	
857.7375	859.4625	

Lee County sheriff:

855.2125, car to car

Fort Myers fire:

154.010, fire
154.250, fire

JACKSONVILLE

Police:

453.150, F-1, north
453.100, F-2, west
453.050, F-3, mid-city
453.450, F-4, south
453.400, F-5, tactical
453.200, F-6, detectives
453.300, F-7, information
453.350, F-8, command
453.325, F-9, narcotics
453.550, F-10, detectives
453.250, F-11, administration
453.600, F-12, tactical

Fire:

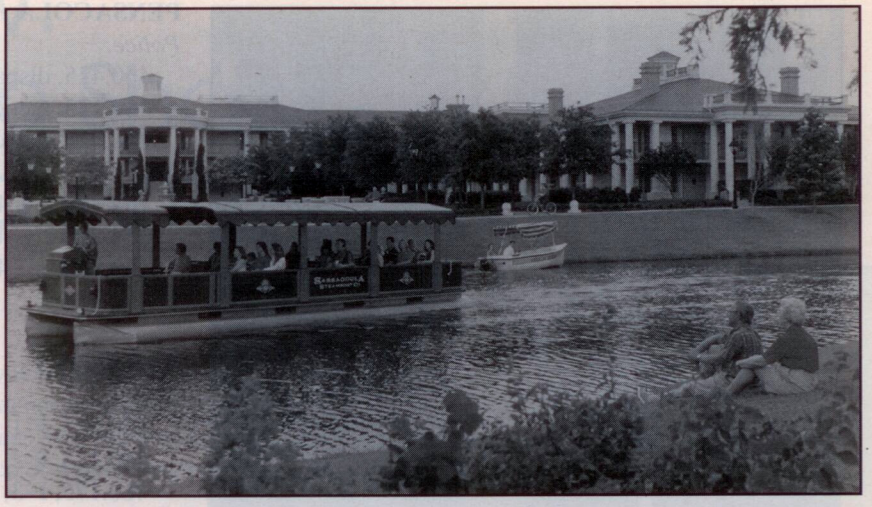
460.575, F-1, fire/rescue
460.600, F-2, fire/rescue
460.625, F-3, fire/rescue
462.975, Med-10, EMS dispatch

MIAMI

Public safety trunked (police and fire):

854.4625	856.9625	859.4625
854.7125	857.2125	859.7125
854.9625	857.4625	859.9625
855.2125	857.7125	860.2125
855.4625	857.9625	860.4625
855.7125	858.2125	860.7125
855.9625	858.4625	860.9625
856.2125	858.7125	851.3625, public
856.4625	858.9625	safety mobile
856.7125	859.2125	phone

A boat ride at Walt Disney World in Lake Buena Vista near Orlando seems like it might be a good opportunity for listening with a handheld scanner. (Photo courtesy of The Walt Disney Co.)



MIAMI BEACH

Police:

856.7875	858.7875	859.9125
856.9125	858.9125	860.7875
857.7875	859.7875	860.9125
857.9125		

Fire:

460.525, dispatch
460.550, dispatch

FORT LAUDERDALE

Police:

460.050, F-1, north
460.100, F-2, downtown/northeast
460.125, F-3, south
460.300, F-4, information
460.200, F-5, tactical
460.325, F-6, tactical

Fire:

470.6125, F-1, dispatch
470.6375, F-2, rescue
470.6625, F-3, fire
470.6875, F-4, fire
470.7125, F-5, fire
471.1375, EMS, mobile to mobile

PALM BEACH

Police:

853.7125, 853.7375, 853.7625

Fire:

154.340, 154.430

ORLANDO

Police:

460.050, F-1, information
460.100, F-2, west
460.400, F-3, east
460.450, F-4, traffic, detectives
460.425, F-5, tactical
460.075, F-6, car to car
460.125, F-7, south

Guests at Epcot Center may come face-to-face with a dinosaur. But do they eat scanners? (Photo courtesy of The Walt Disney Co.)

Fire:

453.050, F-1, dispatch
453.150, F-2, fireground
453.250, F-3, administration
453.350, F-4, fireground, mutual aid

WEST PALM BEACH

Police and fire trunked system:

856.4375	858.4375	859.9625
856.9625	858.9625	860.4375
857.4375	859.4375	860.9625
857.9625		

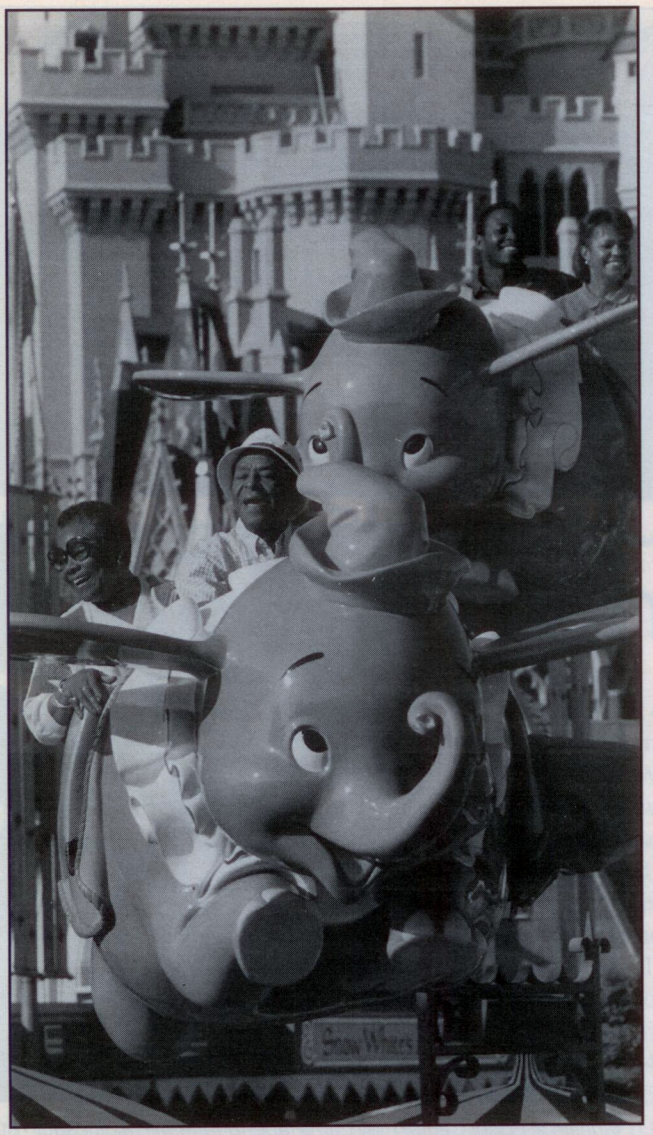
DAYTONA BEACH

Police:

155.070, 154.785

Fire:

154.415, 154.175



PENSACOLA

Police:

460.425, dispatch
460.175, tactical
460.025, detectives

Fire:

154.370	460.575
154.205	460.600
153.950	460.625

SARASOTA

Police:

460.075, F-1, dispatch
460.125, F-2, dispatch
460.175, F-3, operations

Fire:

46.06, F-1, dispatch
46.16, F-2, dispatch
46.36, F-3, dispatch
154.310, F-1, rescue
154.235, F-2, rescue
462.975, EMS dispatch

TALLAHASSEE

Police:

460.125, patrols
460.025, detectives
460.225, information
460.325, tactical

Fire:

154.190, 154.385, fire
462.975, EMS dispatch

Rides, such as Dumbo at Fantasyland in Walt Disney World (top), require two-way radios for the safety and security of visitors. Be sure to check out all the frequencies used at the resort. (Photo courtesy of The Walt Disney Co.)

Two-way radios play a role in the coordination of stunts at the Disney-MGM Studios Theme Park near Orlando. (Photo courtesy of The Walt Disney Co.)

TAMPA

Police:

453.550, F-1, downtown/west
453.700, F-2, east
453.800, F-3, information
453.850, F-4, emergency/tactical
453.750, F-5, tactical-west
453.875, F-6, tactical-east

Fire:

154.430, F-1, dispatch
154.220, F-2, fireground
462.975, EMS dispatch
155.220, F-1, ambulance dispatch
155.325, F-2, ambulance

ST. PETERSBURG

Police and fire trunked system:

856.2125	857.9375	859.7125
856.7125	858.2125	859.9375
856.9375	858.7125	860.2125
857.2125	858.9375	860.7125
857.7125	859.2125	860.9375

CLEARWATER

Police and fire trunked system:

854.9625	857.4375	859.4375
855.7125	857.9875	859.9875
855.9625	858.4375	860.4375
856.4375	858.9875	860.9875
856.9875		

TOURIST ATTRACTIONS

Sea World (Orlando)—151.805, 154.600, 462.000, 463.325, 464.3875, 464.775, 464.825, 464.975, 465.000 (paging system).

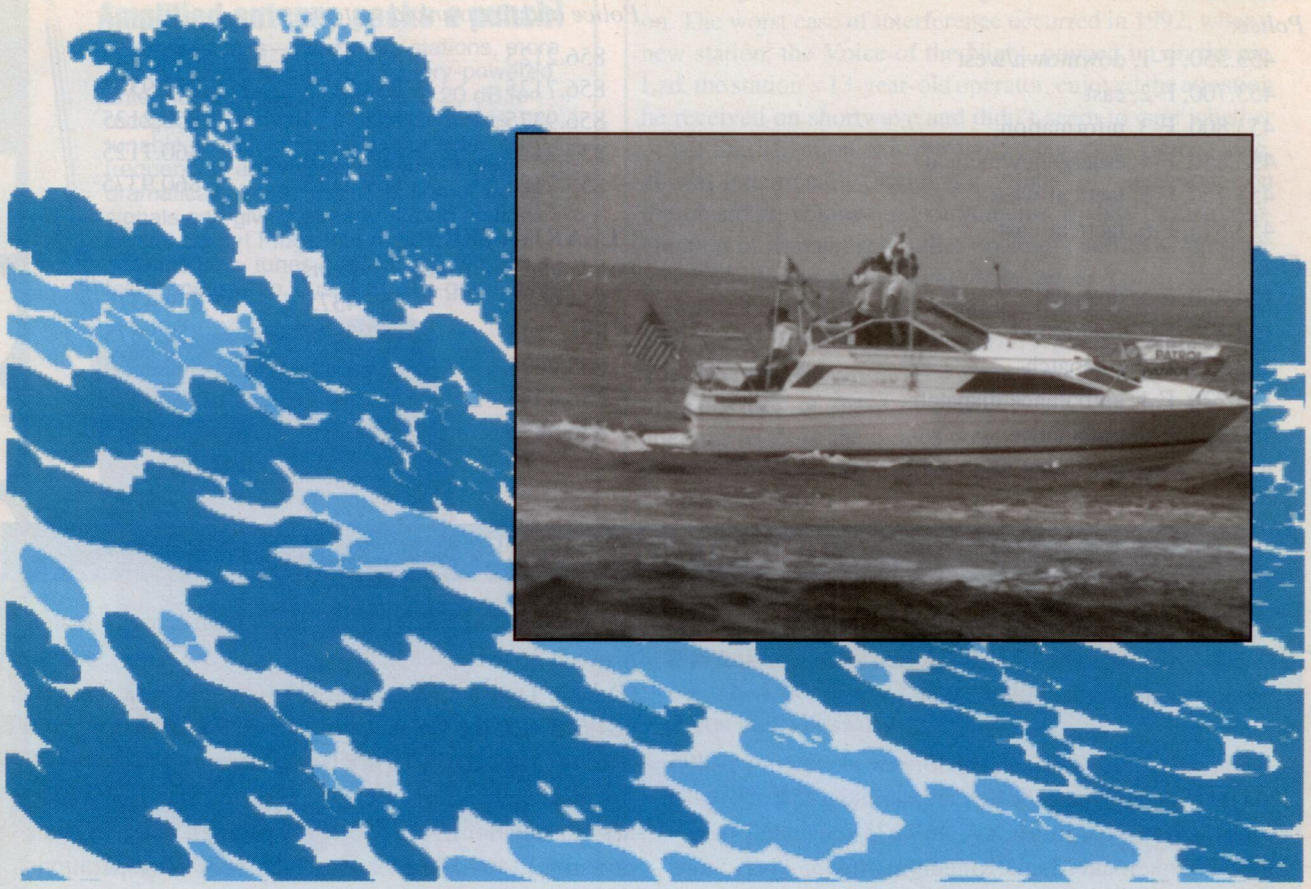
Walt Disney World (Lake Buena Vista)—151.895 (20,000 Leagues Under the Sea submarines), 452.650 (cash control - Wells Fargo trucks), 463.975 (custodial base - EPCOT Center and Magic Kingdom), 469.3375 (E-Stops attractions), 462.550 (entertainment 1 - characters), 461.300 (entertainment 2 - parade dispatch/traffic), 464.9375 (entertainment 3), 464.500 (entertainment 4 - special), 453.825 (Bay Lake fire), 155.370 (Bay Lake police point to point), 463.750 (hailing - Disney-MGM Studios), 464.125 (hailing - EPCOT Center), 464.400 (hailing - Magic Kingdom), 154.47875 (light barges - electrical water pageant telemetry), 462.675 (maintenance 1 - EPCOT Center), 464.625 (maintenance 2 - Magic Kingdom), 464.800 (maintenance 3 - Disney-MGM Studios), 462.650 (operations 1 - EPCOT Center), 462.575 (operations 2 - monorails), 462.625 (operations 3 - Magic Kingdom), 461.600 (operations 5 - Disney-MGM Studios), 464.600 (operations), 157.740 (paging), 462.775 (paging), 462.850 (paging), 464.0625 (people finder), 468.8125 (point-of-sale systems), 462.475 (Reedy Creek Utility District energy services), 464.200 (resorts 1), 461.700 (STEP - fireworks), 151.655 (Space Mountain, riverboats, studio trams), 451.500 (VUT), 461.3375 (warehouses 1), 461.9125 (warehouses 2), 154.430 (Reedy Creek fire intercity), 453.475 (Reedy Creek Improvement District), 453.875 (Reedy Creek fire F1), 453.925 (Reedy Creek fire F2), 852.3625 (Reedy Creek public safety trunked system - also 852.7375, 853.7125, 854.3375), 151.655 (Buena Vista Construction), 461.700 (Buena Vista Construction), 157.740 (Buena Vista Distribution (hotel, staff paging), 462.675 (Buena Vista Distribution - maintenance F2), 461.100 and 464.375 (Cypress Walk), 461.900 (Double Dekka Lines), 461.875 (Grosh Scenic Studios), 464.625 (Reedy Creek Utility District utilities), 464.800 (Reedy Creek Utility District - taxi/transportation), 464.400 (travel center security F1), 461.600 (resorts - Fort Wilderness installation), 462.550 (staff paging), 462.625 (transportation), 464.125 (security F2), 463.750 (operations). NOTE: Disney is moving a lot of radio users to an 800-MHz trunked system. Already security, resorts and watercraft are using the system. Disney also is expected to set up a 900-MHz trunked system.

Busch Gardens (Tampa)—461.7125, 462.0875.

Daytona International Speedway (Daytona)—154.515, 154.540, 464.775, 464.900, 464.500 (NASCAR).

MetroZoo (Miami)—471.2625 (F-1), 470.9375 (F-3), 471.2875 (F-4).

Kennedy Space Center (Cape Canaveral)—148.485 (timing), 165.1125 (command), 163.4625 (security), 162.6125 (launch support), 164.000 (radiation monitoring), 165.1875 (visual surveillance), 170.150 (news media), 170.175 (railroad, trucking), 170.350 (public relations), 170.400 (supplies, maintenance), 171.150 (fuel), 171.2625 (film production), 171.800 (parking), 173.025 (Air Force security), 173.125 (Air Force command), 173.175 (security F-2, tactical), 173.4375 (rescue), 173.5625 (fire), 173.6625 (range safety), 173.6875 (security F-1, astronaut escort), 173.7875 (fire backup), 407.325 (convoy shuttle launch), 407.475 (cranes), 416.500 (range safety). ■



Catching The Sea Waves

It's Maritime!—and the scanning action's at its best on the American waterways.

By Tom Kneitel, K2AES

Any scanner that can receive the 152 to 174 MHz VHF high-band is capable of tuning in on maritime communications. These channels lie in the 156 to 162 MHz range.

The VHF marine band has signals you can hear along coastlines, navigable rivers, and larger inland bodies of water. Tuning in to the various channels, all of which have designated purposes, can summon up shore stations, marinas, yachts, commercial fishing trawlers, tankers, passenger vessels, ferries, tugs, police boats, Coast Guard cutters, pilot boats, barges, dredges, research vessels, work boats and anything else that floats. They all rely upon the VHF band for communications that include working orders, navigational information, and friendly chatter. You can hear search and rescue missions, discussions regarding where the fish are biting, even people stuck on sandbars asking for help. There's no limit. In the warmer months these frequencies are at their most active and interesting.

The Frequencies

The VHF marine band is channelized, with each frequency assigned a number as well as a specific purpose. In most instances, communications are in simplex mode (that means both communicating stations use the same frequency). In the few instances where duplex mode (stations in communication operate on different frequencies) is in use, we will tell you the frequency to monitor that will let you hear both sides of the conversation.

Stations aboard vessels are required to have a minimum of three channels upon which they must operate. These are intership safety Channel 06 (156.30 MHz) and emergency

Without a doubt, pleasure boats cause the VHF marine channels to fill up very quickly as soon as the nice weather arrives.

Channel 16 (156.80 MHz), along with at least one working channel. Most vessels have equipment that exceeds these minimum operating capabilities by covering the two mandatory channels plus Channel 22A for Coast Guard communications, Channel 09 for calling, plus a marine operator channel, and several more working channels.

The Channels and Uses

Here is a general overview of the special uses designated for the VHF maritime frequencies, giving the frequency, and also the assigned channel number.

Distress & Safety: 156.80 MHz (Ch. 16). The Coast Guard monitors this channel, as do coastal stations and commercial vessels. Ships calling with distress traffic on this channel will usually be asked by the Coast Guard to switch to 157.10 MHz (Ch. 22A). Ch. 16 is also the calling channel used by commercial vessels.
Calling: 156.45 MHz (Ch. 09) is the calling channel for non-commercial vessels.
Coast Guard: 157.05 MHz (Ch. 21); 157.075 MHz (Ch. 81); 157.15 MHz (Ch. 23).
Coast Guard Auxiliary: 157.175 MHz (Ch. 83).
Misc. U.S. Government: 157.125 MHz (Ch. 82).
Port Operations: 156.275 MHz (Ch. 65A); 156.325 MHz (Ch. 66A); 156.675 MHz (Ch. 73); 156.725 (Ch. 74); **Intership:** 157.00 MHz (Ch. 20A); **Docking (low power):** 156.875 MHz (Ch. 77); **New Orleans, LA & lower Miss. River:** 156.05 MHz (Ch. 01A); 156.175 MHz (Ch 63A); 156.25 MHz (Ch. 05A); **Houston, TX:** 156.25 MHz (Ch. 05A); **Gt. Lakes & St. Lawrence Seaway:** 156.60 MHz (Ch. 12); 167.70 MHz (Ch. 14).
Intership Navigational: 156.65 MHz (Ch. 13); 156.375 MHz (Ch. 67). Mostly used by ships requesting drawbridges to open. Also intership use in some areas of Miss. River & Great Lakes.
Intership Safety & Search/Rescue: 156.30 MHz (Ch. 06).
Administrative/Enforcement: 156.85 MHz (Ch. 17).

Commercial fishing trawlers chat with one another about the luck they have had, and where the fish are being caught.

Commercial Operations: 157.35 MHz (Ch. 07A); 156.45 MHz (Ch. 09); 156.50 MHz (Ch. 10); 156.90 MHz (Ch. 18A); 156.95 MHz (Ch. 19A); 156.975 MHz (Ch. 79A); 157.025 MHz (Ch. 80A); **Intership:** 156.40 MHz (Ch. 08). Commercial channels can bring you stations operated by passenger lines, fishing companies, tug and barge dispatchers, ferry lines, etc.
Non-Commercial Operations (Pleasure craft & marinas): 156.425 MHz (Ch. 68); 156.45 MHz (Ch. 09); 156.475 MHz (Ch. 69); 156.575 MHz (Ch. 71); 156.925 MHz (Ch. 78A): **Intership:** 156.625 MHz (Ch. 72); **Great Lakes:** 156.975 MHz (Ch. 79); 157.025 MHz (Ch. 80A). Listen to these channels for yachts and other recreational craft. Shore stations, including yacht clubs, marinas, public docking facilities, are here. The busiest channel has traditionally been 156.425 MHz (Ch. 68).
Marine Operators (ship-to-shore phones): 161.80 MHz (Ch. 24); 161.825 MHz (Ch. 84); 161.85 MHz (Ch. 25); 161.875 MHz (Ch. 85); 161.90 MHz (Ch. 26); 161.925 MHz (Ch. 86); 161.95 MHz (Ch. 27); 161.975 MHz (Ch. 87); 162.00 MHz (Ch. 28).

These are the basics of the VHF maritime band, based upon information in FCC Regulations, Part 80. For additional information, refer to FCC Part 80. Usage in Canada is generally similar in this band. Of course, every available channel isn't necessarily active in every area.

Stations

Most VHF band shore stations use 50 watts or less, while vessels don't use more than 25 watts (many small craft don't use even that much). Reception from your location should be possible at least out to the horizon, and possibly a bit beyond.

A good antenna mounted as high as possible will offer your station the furthest reach. Consider a discone scanner/ham roof

antenna, as this will do an outstanding job. It is easy to install, and has low wind resistance.

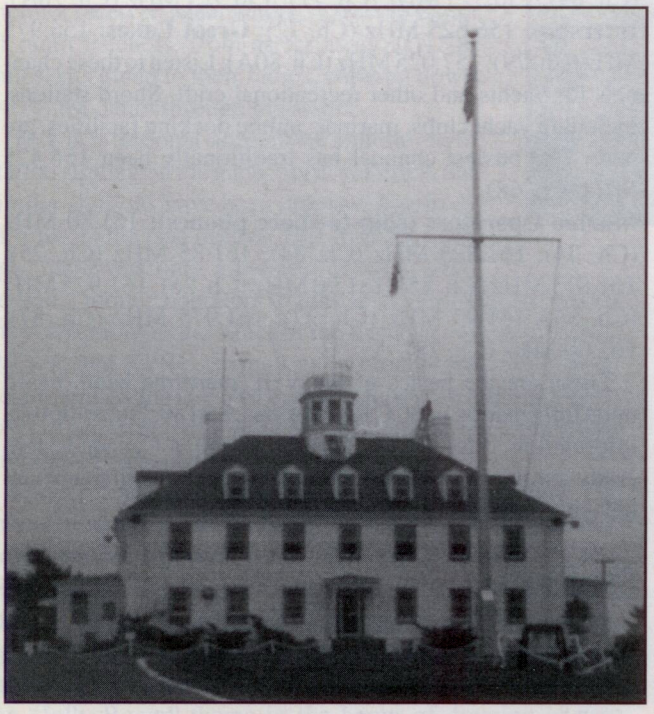
Shore stations and ships are all assigned official call letters, although they don't always announce them (as they are required to do). Radio Shack offers a 400-page *Marine Frequency Guide (Cat. 62-1031)*, which lists 27,000 coastal stations in the U.S. You will most likely find this reference guide to be of considerable help in determining the identity of those stations that aren't diligent about stating their callsigns. In addition, it provides a generally useful source of data about what you're monitoring on these channels.

Scrappy little work boats can be heard on the VHF channels as they go about their many duties.

That's Not All, Folks!

The UHF band (nominally 406 to 512 MHz) is part of the coverage offered by scanners. That could offer some extra maritime monitoring opportunities in the event you happen to be located near a busy commercial seaport.

Crew members aboard commercial vessels such as tankers, passenger liners, and container carriers use handheld radios to keep in touch with one another while they are working. But some ships are so large that it became feasible to use low-powered repeaters to ensure communications throughout the vessels. The repeater antenna can't be more than 10 feet above a ship's working deck, so the range is kept somewhat limited. Still, for a scanner owner in close proximity, these communications can be heard while a ship is arriving, at dockside, or departing.



The U.S. Coast Guard guards VHF Channel 16 for emergencies, but can also be heard on other frequencies in this band from their numerous cutters and shore stations.

The repeater frequencies are 457.525, 457.55, 457.575 and 457.60 MHz.

Here's a bonus for owners of the PRO-2006 (reviewed in this issue) scanners, at least those who live in areas where a relatively new maritime service has been activated! It's called the Automated Maritime Telecommunications System (AMPS). AMPS was primarily conceived as a voice and non-voice (Fax and teletype) maritime service to operate between vessels and coast stations along our nation's inland waterways and in conjunction with offshore oil operations in the Gulf of Mexico. The thing is that AMPS operates on a frequency band not usually covered in most scanners. However, the PRO-2006, being a sophisticated unit designed for the adventurous listener, does include these channels.

To check for AMPS activity in your area, try putting your PRO-2006 into search mode. Enter 217.0125 MHz as the lower frequency limit, and 217.9875 MHz as the high frequency limit. Start searching in 12.5 kHz steps. If you hear any stations, then you are picking up AMPS transmissions.

Bon Voyage

You now have enough information to sail off and reel in plenty of interesting stations with your scanner. You will be able to select those channels that best suit your interests. You could hear a MAYDAY (emergency call). You will undoubtedly pick up a large helping of shouts for help from hapless boaters who have run out of fuel, gone aground, had engine problems, or any of the other maritime problems. You'll hear everything from tall fishing tales about the one that got away, to the rather serious business of the Coast Guard on a search and rescue operation.

It's all there on the VHF marine band waiting for you to turn on your scanner!

Your Monitoring Post—The Key To Your Listening Enjoyment

Unpack your receiver or scanner, plug it in, connect an antenna and start listening. But wait, there's more to it than that....

By Harold Ort, N2RLL

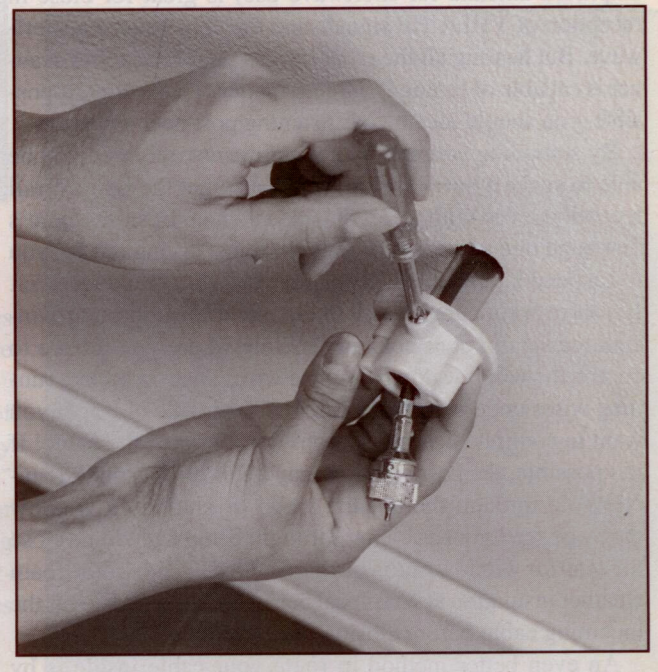
You've spent your hard-earned money on that whiz-bang scanner with all the bells and whistles and you just can't wait to hear all the action. Before you turn on the power, though, you should take a moment to really consider your listening habits.

Are you a "catch the local action" (police, fire, EMS) person who listens from the kitchen or living room? If so, then you'll only need to open the box, program your desired frequencies, pull up the telescoping whip antenna and listen. But, if you're interested in getting away from it all, having a reasonably quiet listening environment, away from potential coffee spills and *I Love Lucy* reruns, organizing a listening post is what you need to do.

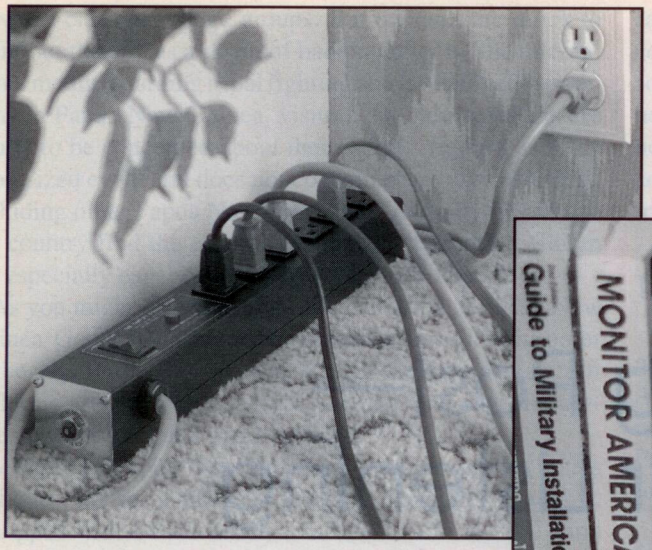
Your Little Corner of the World

Maybe it's because I'm just a quiet person (don't laugh, it's true!) that, like many folks, I need a special place to enjoy the monitoring hobby. I'm fortunate enough to have a separate room with a door. Maybe you do, too. Frankly, that's the ideal situation.

But if the ideal situation simply isn't possible for you, consider claiming part of a small table as your little corner of the world, preferably near a window you can open. After all, you're only bargaining with your spouse for an area about the size of your average microwave! If possible, though, stay out of the kitchen. There are plenty of horror stories of scanner and shortwave radio users who have sent their prized electronic gear to the great beyond by spilling any number of liquids onto the case. That's also where junior makes his favorite milkshake—right near your new scanner! That's just a word to the wise.



The Wall-Thru Lead-In Tube (15-200) is designed for a more permanent listening post installation.



It's a good idea to use a surge protector outlet, such as the 61-2780, for your communications gear.

This neat-looking monitoring post with the PRO-2006 as a centerpiece has plenty of reference books, a logbook, and a world map. (Photo by Chuck Robertson.)

Many homes today have a specific area set aside for the family computer. There's usually ample writing space on most computer furniture and even room for your new receiver.

A Word about Antennas

You can't catch a whale with a fishing rod. By the same token, you aren't going to catch many signals without a reasonably good antenna. Sure, the telescoping whip (and even the back-of-set telescoping whip for scanners or the amplified antenna for shortwave use) is great for close-in reception of VHF/UHF signals and the "big guns" on shortwave. But hearing all the other signals your receiver or scanner is capable of tuning is another matter. That's why, if possible, you should locate your listening post near a window.

By stationing yourself by a window, not only will you be able to snake a wire outside, you'll also get the best overall reception, even without an outside antenna. Besides, there's that huge tree at the end of your yard just crying out for you to suspend a longwire antenna for your shortwave receiver. If you're fortunate enough to have that all-important window, never run your coax or feedline where you'll have to crunch the window down onto the wire. That's a lot like running wires under carpeting and it violates rule No. 1: If you want to continue hearing stations don't crunch the cable! If it's possible, the best solution may be to drill a small diameter hole through the outside wood or aluminum window base and feed your cable on through. Similarly, don't close the *interior* window onto your cable. Instead, buy some foam weather insulation at your local hardware store and cover the incoming cable before closing the window.

An even better method to route your cable inside is by using a lead-in tube, such as Radio Shack's Wall-Thru (#15-1200). For under three dollars, you'll be able to go through walls up to 13 inches thick. Just be careful drilling through the wall; remember, there could be electrical wires inside!

Also, don't overlook security. Today it pays to install some sort of window lock. I've used a small barrel bolt lock fastened to the bottom of the wooden window. The bolt slides into a small hole in the window casing. It isn't very pretty, but it does the trick.

Is there a Vacant Wall?

One of the fun things about radio listening is that it greatly improves your understanding of basic geography. Before I started listening to the radio many years ago, remembering which side of the Mississippi I lived on was a task. Just kidding! Imagine though, being able to track high-altitude flights on a wall map as they criss-cross the oceans. Or keeping track of moving police vehicles as they check in around your county. If you've got the room, get a wall map and cover it with a piece of plexiglass, or visit your stationery store for a new plastic-coated world map. It'll add hours of enjoyment to an already fascinating hobby.

I've become a "geograholic." There's a world map to my right and a map of the eastern seaboard on a wall to my left. I use the east coast map to track weather as it moves our way and to quickly spot large cities that have clear channel AM broadcasters. I also have frequencies, call signs, and city locations listed vertically near the map.

The Electrical Outlet

When you finally decide on an area for your set-up, don't overlook the electrical outlet. Sure, you need electricity, but more than that, you need *convenient* electricity. Imagine this scenario, for instance: It's 2 a.m. and you're sound asleep. You awaken suddenly to see your digital alarm clock blinking "12:00" and hear the dog barking at the lightning and

loud claps of thunder. Your first instinct should tell you to unplug any sensitive electronic gear, like computers, TVs, VCRs, *and* your receivers. And do it right away! You don't need a direct lightning strike to fry your radios. I'm a weather watcher from way back. You should be too, now that you've got your scanner plugged into the outlet. If possible, try to locate an outlet that's easily accessible in the dark with the dog running under your feet. Seconds count.

An even easier remedy is to be aware of approaching storms and unplug your equipment *before* the storm is near. Unplug the antenna, too! Surges, static build-ups, and lightning from many miles away can completely devastate your listening post. Then, it's too late. It's also a good idea to buy a power strip. Radio Shack's six-outlet strip (#61-2780), for instance, offers a great noise filter and is rated at 15 amps. That's protection enough for your computer and a couple of receivers.

Tape Record or Take Notes

You may want to add a tape recorder to your listening post, too. There's absolutely nothing wrong with recording broadcast stations and the like for your personal library or to send to the station in an attempt to obtain a QSL card/letter. A tape recording is certainly irrefutable proof you did indeed hear a certain broadcast or transmission. Serious shortwave monitors do it all the time. Some foreign stations, in return, will even record some native music and return the cassette to you with their QSL card.

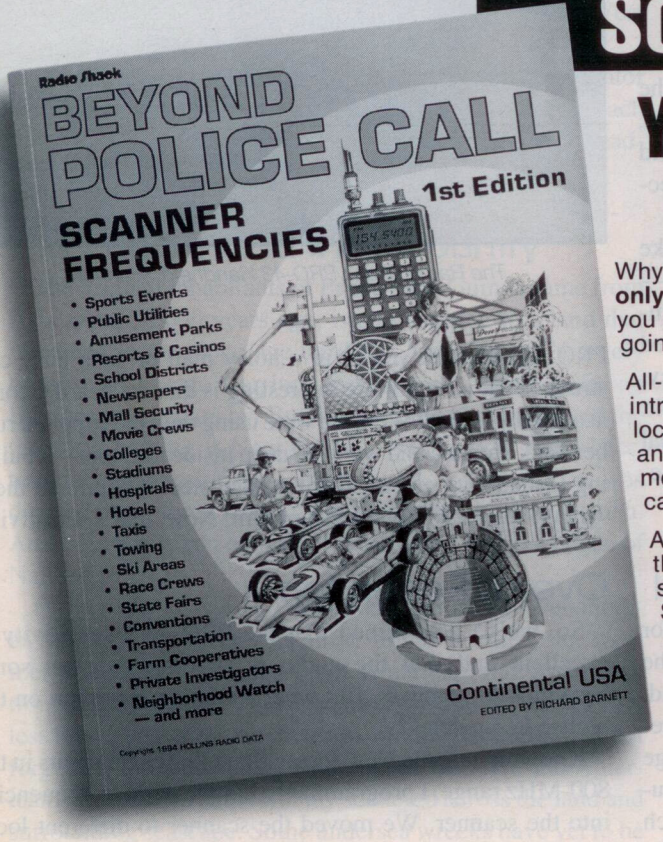
But—this is important—there are a few things you should never do. NEVER. For example, never tape record certain "personal" communications. When, and if, you tune them, you'll know when to turn off the recorder. It's also not wise to tape record military or government stations and send the recording to the agency involved to attempt to get a QSL card. The right way is to write a letter, telling the date, time and frequency of your "catch," naming the two stations which were in contact, and OMITTING any details of what you heard. When you turn on the receiver, turn on your common sense, too. Another word to the wise!

Just remember, much of what you hear on shortwave and scanner frequencies isn't a *broadcast*: it is a *transmission*. There IS a difference!

A Final Thought

While you and I really live for radio, there might be family members who don't appreciate the static and constant din of radio signals drowning out those *I Love Lucy* reruns. For their peace-of-mind, and yours too, invest in a good pair of communications headphones. Radio Shack offers a headset (#20-210) that sells for $9.99.

Now, settled in at your monitoring post and armed with your latest copy of *Police Call, Beyond Police Call*, your monitoring magazines, and that brand new receiver, you're off to many years of listening enjoyment. ■



SCANNER LISTENERS

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In Review: The PRO-43 Handheld Scanner

By Harold Ort, N2RLL

Always interested in replacing a scanner (or simply adding a new one to my ever-increasing collection!), I decided to check out the PRO-43 (Radio Shack Catalog # 20-300, $349.99). What I found is that it's a *terrific* scanner with ample audio. It's also compact, lightweight, easy to operate, and has plenty of frequency coverage, even for the most discriminating user.

This neat little handheld (only $5^3/_4$" x $2^3/_4$" x $1^5/_8$") covers 30–54, 118–174, 220–225, 225–400, 400–512, 806–823.9375, 851–868.9375, and 896–999.9875 MHz in 200 channels. These are the important fire, aircraft, military, federal, amateur, public service, and the new 800/900 MHz public service bands.

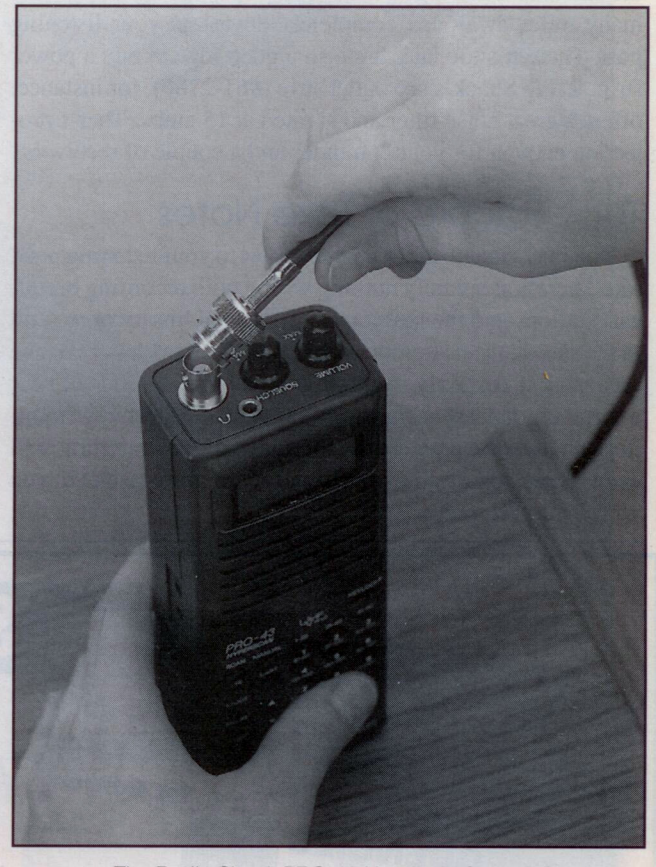
Checking it Out

My investigation began when the salesperson removed the unit from the shelf and proudly discussed its main features, including ease of programming, Hyperscan (this handheld zips through programmed channels at 25 channels per second), its banks, and handy display light.

It certainly is easy to program. I'd expect it should take only a few minutes to become a seasoned PRO-43 user—there are no complicated programming sequences to remember. When it was my turn to play, I right away programmed the national amateur 2-meter simplex calling frequency, 146.520 MHz, into the unit and turned up the volume a bit. While I waited, I thumbed through the owner's manual which, by the way, is clear and easy to read (especially useful for first-time buyers).

George Must Be in the Parking Lot!

If you think your scanner has powerful audio, you're in for a surprise with the PRO-43! Within a couple of minutes, the salesperson and I both jumped as we heard my ham friend, George, make a call in a nearby town. The volume was barely half-way open, but that's all the volume we needed. George sounded as if he were right outside the store. There are actually handheld *ham* transceivers out there that don't have such good audio! You'll have no trouble hearing stations with the



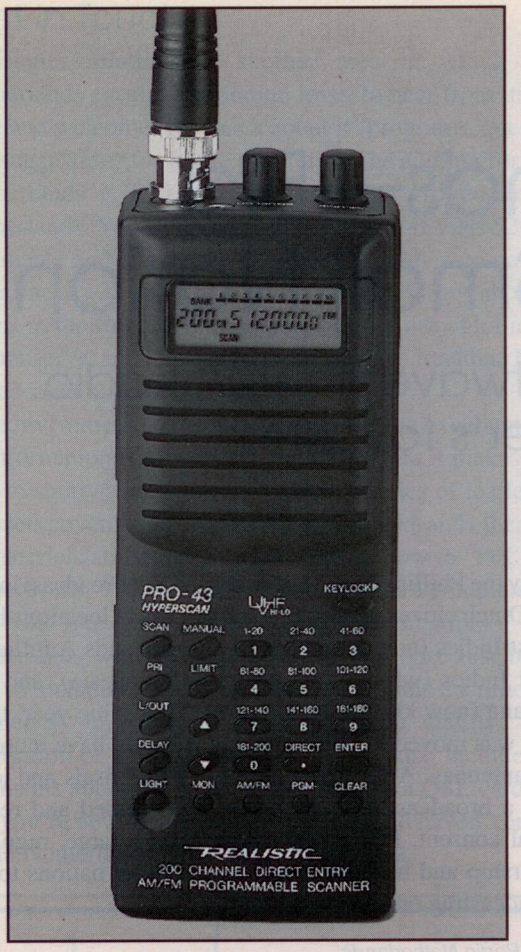
The Radio Shack PRO-43 Handheld Scanner.

PRO-43, whether you're in a noisy mall or on a busy city street. What's even more interesting is that we heard George at all. Why is that? Well, we were using only the supplied rubber duck antenna and we were deep inside the store—a building loaded with electrical wiring and steel. Despite all these "signal-stealers," we still heard him! Now, that's sensitivity.

Overall Reception

So, we've determined that the PRO-43's sensitivity is excellent and that the audio is superior to even some base/mobile scanners. But what about the reception on the higher frequencies?

Knowing that the New Jersey State Police transmits in the 800-MHz range, I programmed a couple of their frequencies into the scanner. We moved the scanner to different locations in the store and, more than half the time, we could dis-



The PRO-43 scanner can also be used with a mobile or base antenna by connecting your coax to the antenna connector.

tinctly hear transmissions from several miles away. All this with only that supplied rubber duck antenna!

A Look at the Display Window

The display window is easy to figure out. Large, easy-to-read numbers show the unit's operating mode, frequency, and current status. A multitude of prompts tell you exactly what your scanner is doing. For example, if you're scanning all 10 banks (there are 20 channels in each bank for your convenience), all 10 horizontal bars will appear across the top of the window. If you've locked out Banks 8 and 9, the bars below their corresponding bank numbers will be missing. Just a simple keypress during scanning restores them to the scanning mode. Channel numbers are visible to the left, but, unless you're in the manual mode, you'll have to look quickly to see the numbers—the unit scans that fast!

Wait, there's More

There are plenty of additional features, too. One of them, the PRO-43's priority channel selection, lets you select any channel as your priority channel. And, the frequency you put in to the priority channel can be any frequency in the scanner's range. When activated by a simple keypress, the scanner will automatically sample that channel every two seconds. For example, you might want to select your county fire dispatch or a local police frequency as your priority channel. This way you'll never miss a call on that frequency.

Looking at the top of the PRO-43, you'll see only two controls: the volume and squelch. There's a socket for an earphone (not supplied) or headphone. Speaking of headphones, using them is a great way to save on batteries.

And speaking of batteries, you can power the PRO-43 with six AA batteries, or you can use nickel-cadmium (NiCd) batteries (Radio Shack Catalog #23-125) and charge them in the side jack with Radio Shack DC adapter #270-1560A. This adapter also powers the PRO-43 from a vehicle's cigarette lighter socket. Another Radio Shack 9-volt AC adapter (20-188) allows you to use the scanner from AC power. But be sure to plug either of these adapters into the correct jack! Not doing so could damage the scanner or the adapter. When I first powered up the scanner, using moderate volume levels, I easily got several hours use from the AA batteries. The NiCds provided about three and a half to four hours of operation under my particular listening situation. (Remember—the louder the volume and the more frequently you use the display light, the faster you'll go through batteries or have to recharge the NiCds.)

The PRO-43 as Your Primary Scanner

If you're using an outside antenna (like the Radio Shack discone antenna) or other signal catcher, you can use the PRO-43 just like you would a larger base model scanner. While some folks believe you should have a base-type scanner in your home because "it's more powerful and sensitive," don't believe it! The only difference between your PRO-43 (or any other handheld, for that matter) and a comparable base/mobile is its size.

To use the PRO-43 as a primary base or mobile rig, simply connect the coax to the top of the unit. If your coax terminates with a standard PL-259, pick up a Radio Shack adapter for $2.59 (#278-120). Then simply twist the coax assembly onto the scanner's antenna receptacle. It's that easy.

And Yet Another Handy Feature!

One of the best ways to find new frequencies in your area is to use a scanner's search mode. Operating the PRO-43's search mode is straight forward. But what's particularly useful is its ability to store up to 10 of these "finds" in a monitor bank. Then, as your heart desires, you can add any or all of the 10 new frequencies into the PRO-43's channels for scanning. All that's required is a simple three-step operation and you're in business.

Get One Yesterday!

Very seldom do I review a piece of electronic gear and get a burning desire to run out and buy it. But after using the PRO-43 for a couple of weeks, I couldn't help myself. Surprise, I now have a new addition to my scanner collection. ■

Radio Netherlands—Big Station From A Small Nation

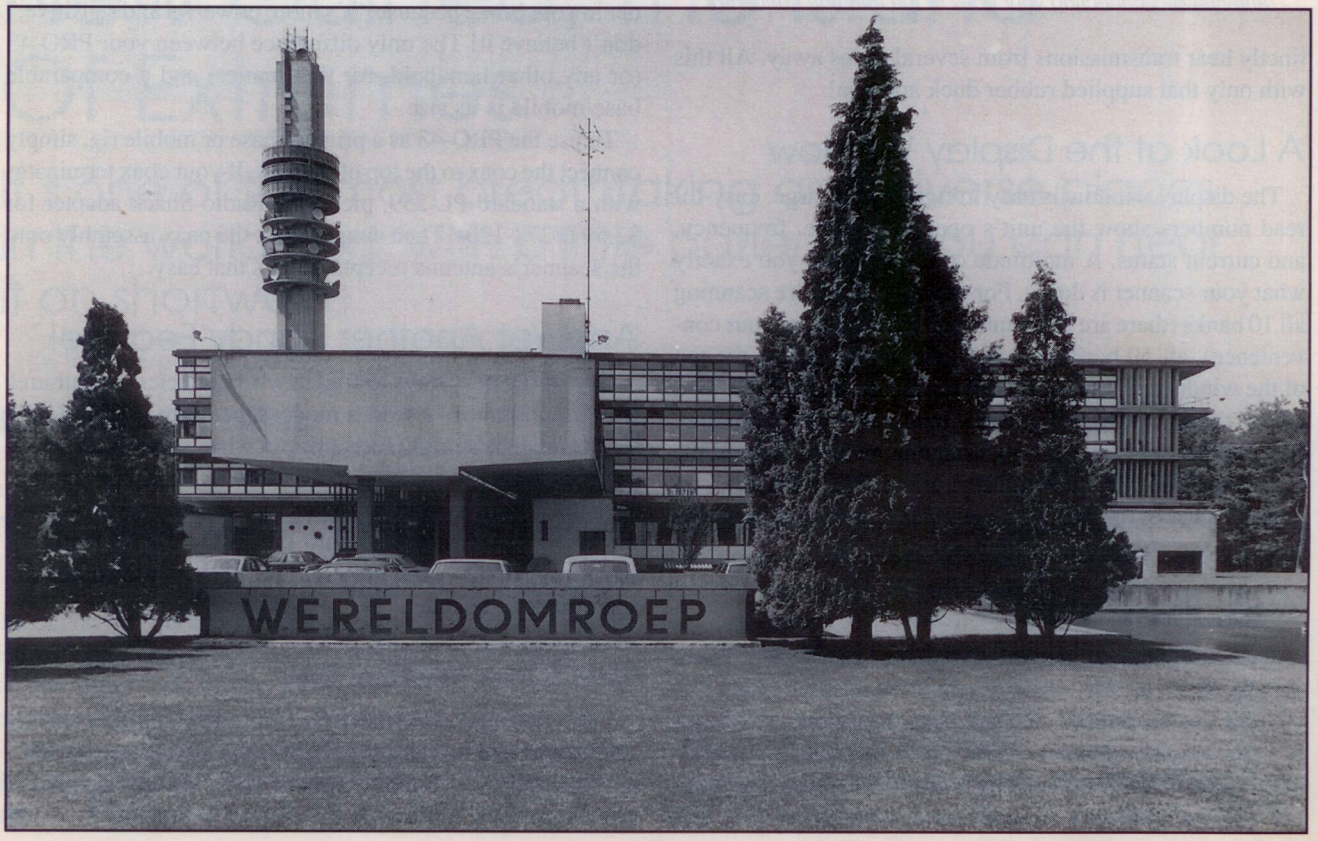
Since it was first heard on shortwave in 1927, Radio Netherlands has been a listener's favorite.

By Gerry L. Dexter

Signals and programs from dozens of high-power broadcasters clamor for attention on the shortwave dial every hour of every day. Unfortunately, all too many of them don't really have a lot to say, or, if they do, they don't say it very well. But that's not the case with Holland's international voice—maybe because it's just had more experience.

Radio Netherlands, "the Dutch International Service," and its predecessors have been speaking to the world via shortwave radio longer than any other national radio station. First heard in 1927, it began broadcasting a full decade before the venerable BBC. The station, PCJ at Eindhoven, was operated by the Phillips Radio Laboratories and broadcast in Dutch for Dutch citizens and subjects overseas in locations like the West Indies (now known as the Netherlands Antillies), the East Indies (which is now part of Indonesia), and Dutch Guiana (now known as Surinam). That same year, the station was moved to Huizen where it would have more room for antennas. After many months of proposals and jockeying, a broadcasting corporation was formed and received royal consent. PCJ quickly developed a large, regular listenership and has surely influenced other nations to begin broadcasting on shortwave.

The Hilversum headquarters of Radio Netherlands.



The Radio Netherlands newsroom.

One of Radio Netherlands' radio control rooms in action!

PCJ's mission stayed essentially the same and its broadcasts continued, in Dutch only, right up to the black days of World War II. During the war, the facility was taken over by the Nazis and incorporated into their propaganda machine. Free Dutch voices were still to be heard on Radio Oranje, the voice of the Dutch government-in-exile, aired from England over BBC transmitters.

Holland Liberated

"We are free! The occupier is defeated. The Netherlands has won the war!" Those words, spoken on May 4, 1945 over a transmitter in the liberated part of Holland, marked the beginning of the post-war era for Dutch radio. It wasn't long before the Huizen facilities were speaking to the world again, although it did take a couple of years for the dust to settle. A gestation period lead to the birth of a Dutch world voice in early 1947 that was firmly established with a clear charter. Known as Stichting Radio Nederland Wereldomroep—the Netherlands World Broadcasting Foundation, the station began a regular English service also early in 1947.

A True Survivor

The station has survived through many ups and downs, financial crises, governmental reviews, and what-have-you. It remains an independent public foundation, funded by a portion of the license fees which everyone who owns a radio or TV set in the Netherlands must pay (similar to the car license plate fee in our country).

As the service grew over the years—adding additional broadcast languages, more target areas, and more powerful transmitters—so did the need for a larger transmitting facility. What had grown to be a 35-kW transmitter at Huizen was eventually replaced in 1949 by a 40-kW unit at Lopik, and 100 kW units were added in the early 1950s. Radio Netherlands' studios and offices, which had been scattered through several houses and buildings, were finally brought under one roof in 1959 in a new building designed specifically for the station's use.

The Radio Netherlands complex from above.

With no room for expansion, the Lopik site was replaced in 1985 by a new, ultra-modern transmitting facility in Flevo that has four 500 kW transmitters (and a 100 kW spare). Flevo is actually below sea level, so Radio Netherlands refers to the location as "500 kW under the sea." It draws three and a half million watts of power from the local power supply. Transmitter frequencies and antenna patterns are controlled by a computer at the Radio Netherlands studios in Hilversum.

Relay Sites

To provide a more powerful signal to its far-off service areas, Radio Netherlands, like many of the major broadcasters, makes use of transmitters outside its national territory.

In 1969, it put a shortwave relay on the air from Bonaire in the Netherlands Antillies off the coast of South America. The two 250-kW transmitters at the Bonaire relay station are usually responsible for the strongest Radio Netherlands signal we hear in North America.

A year later, another relay station went on the air from Talata/Volonondry in Madagascar, off the east coast of Africa. It uses a pair of 300-kW transmitters.

THE PARTS PLACE SM

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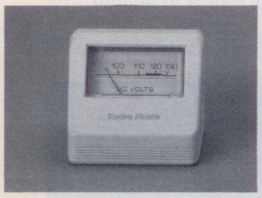
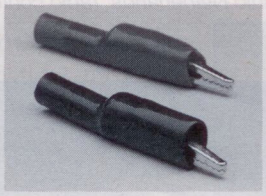
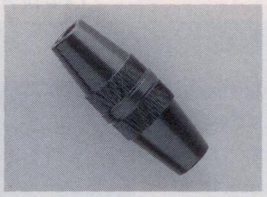


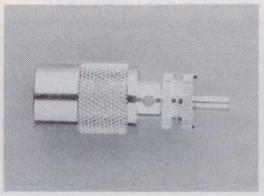
AC Line Monitor. Helps protect your equipment. Plug-in voltage meter with color-coded scale indicates safe zone at a glance. #22-104 .... **12.99**



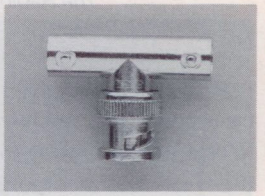
Alligator Clip Adapters. Great for attaching multitester probes to test points and terminals. Slip over probe tips. #270-354 ..... **PAIR/2.19**



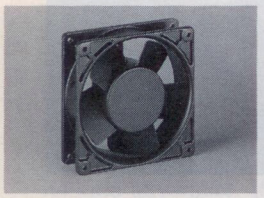
Indoor 75-Ohm Cable Splicer. Simplifies radio antenna and video hookups. For coupling and splicing RG-58/59/6. #278-226 ..... **PAIR/3.19**



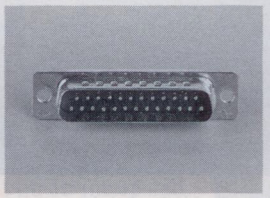
Premium PL-259 Plug. Preferred for RF/antenna hookups. Silver-plated body, heat-withstanding Teflon™ insulator. #278-188 ..... **3.49**



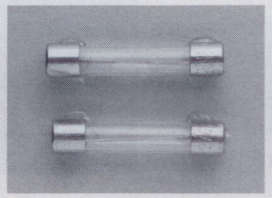
BNC T-Adapter. Type UG-274, with female-male-female configuration. For reliable RF hookups, connect with us! #278-112 ..... **3.19**



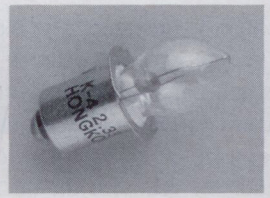
120VAC 4" Fan. Use to dispense heat in Ham equipment, PCs, home and car audio. 65 CFM. 22 watts. $4^{11}/_{16} \times 4^{11}/_{16} \times 1^{1}/_{2}$". #273-241 ..... **18.99**



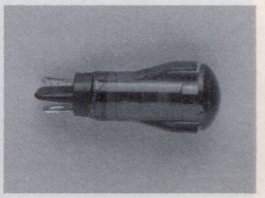
Solder-Type 25-Pin Male D-Sub Connector. Has gold-plated pins and terminals for reliable connection, metal shell for shielding. #276-1547, **1.49**



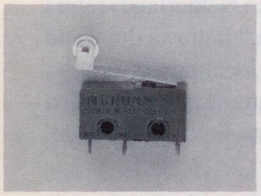
Glass-Type Fuse Kit. Be prepared with spares! Two SFE-20; one each of AGC3, 10, 15, 25, 30; one each of SFE 7.5, 9, 14. #270-1262 ..... **10/1.99**



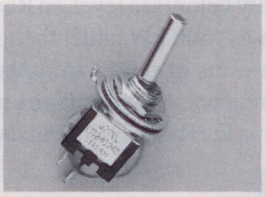
Super-Bright Krypton Lamp. Replaces PR-4 flashlight lamp. Flange base. 2.33 volts, 480 mA. Seven other kryptons in stock. #272-1169 ..... **1.19**



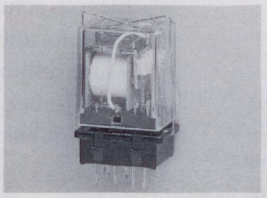
Brilliant Red LED Panel-Mount Lamp. Rated 500 mcd. Rated 2.2VDC at about 20 mA. Snaps into $^{11}/_{32}$" mounting hole. #276-088 ..... **1.89**



¾" Roller Lever Switch. Single-pole, double-throw type. Operates at five grams, rated 5 amps at 250VAC. Body: $^{3}/_{4} \times {}^{1}/_{4} \times {}^{3}/_{8}$". #275-017 ..... **2.19**

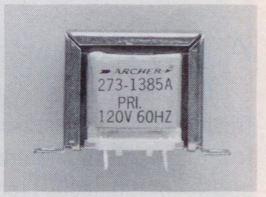


Micro Toggle. Single-pole, single-throw. Rated 3 amps at 125VAC, fits ¼" hole. One of dozens available—see before you buy! #275-624 .. **2.29**



Plug-In Relay With Socket. DPDT contacts, rated 3A at 125VAC. With schematic, pin-out diagram and full electrical specs. #275-206 .... **5.99**

"Ding-Dong" Chime. IC/minispeaker is ideal as an entry alerter. Requires 6 to 18VDC, produces about 80dB at 12VDC. 5" leads. #273-071 ..... **9.99**



Mini Transformer. Has tabs and pins for mounting on printed circuit boards. 12.6V, 300 mA. $1^{1}/_{4} \times 1^{7}/_{16} \times 1^{1}/_{16}$". #273-1385 ..... **3.99**

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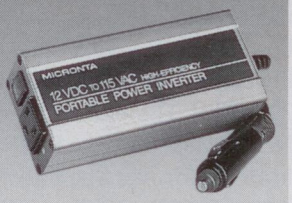
For camping, tailgate parties and emergencies. Plugs into car/boat lighter socket, converts 12VDC to 115VAC for powering a small appliance, light or tool. Rated 140W continuous. #22-132 ..... **99.99**



Radio-frequency LCD digital counter

Ideal for radio hobbyists and essential for repairs. Measures 1-1300 MHz RF, displays signals with different resolutions and update rates. Selectable input impedance, backlit display. #22-305 ... **99.99**

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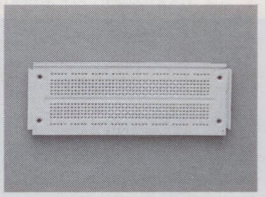
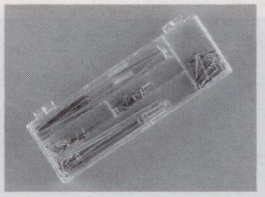
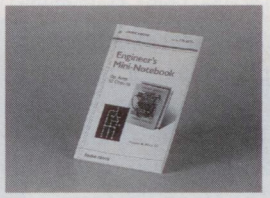
Building Power Supplies. Explains switching and linear types. Plans for five supplies built with Radio Shack parts. 92 pages. #276-5025... **4.99**



Solderless IC Modular Breadboard Socket. Silver-nickel contacts, 550 plug-in points. Expandable design. 2⅛ × 6". #276-174 ..... **12.49**

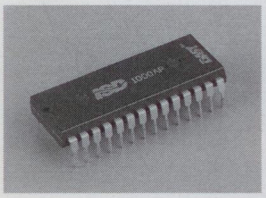


Jumper Wire Kit. Speeds project building! Includes 140 insulated, stripped wires—10 each of 14 lengths in a snap-shut box. #276-173 ..... **5.49**

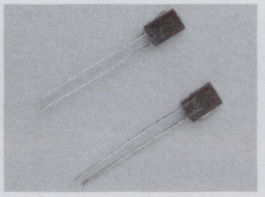


Engineer's Mini Notebook: Op Amps. Engaging descriptions and interesting projects from science writer Forrest Mims III. #276-5011, **1.59**

PC Board Kit. Etch your own! Two 4½ × 3" boards, resist-ink pen, solvent, etchant, tank, 1/16" drill bit, instructions. #276-1576 ..... **10.99**

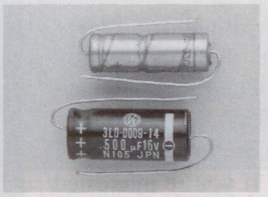


Digital Voice IC Chip. Stores and plays back up to 20 seconds of speech or other audio. Built-in power amp and logic circuits. #276-1325 ... **17.99**



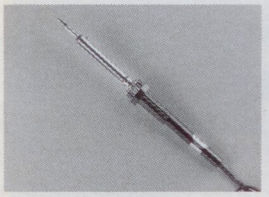
Rectangular LEDs. Low-cost way to light up projects and models. Red, yellow, green, regular and hi-efficiency types. #276-1655, **10-Pack/2.29**

¼-Watt Carbon Resistor Assortment. Hard-to-resist collection includes 100 pieces of 13 popular values. 5% tolerance. #271-308, **Set of 100/2.99**



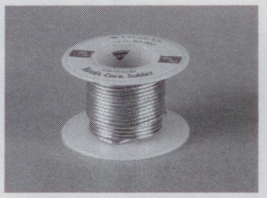
Electrolytic Capacitor Assortment. Includes mini and submini sizes in a variety of styles, rated up to 50WVDC. #272-802, **Set of 20/2.29**

Eight-Piece Nutdriver Set. With interchangeable power-grip handle. Nutdriver sizes: 1/8", 3/16", 7/32", 1/4", 9/32", 5/16", 11/32", 3/8". #64-1800 ..... **7.49**



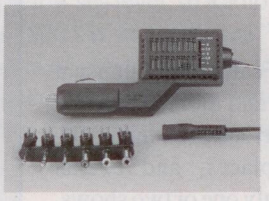
40W Soldering Pencil. Develops 600-640° F. Screw-in 1/4" tip, safety stand. #64-2071..... **7.49**

Replacement Tip. #64-2072 ..... **1.29**



.062" Rosin-Core Solder. For reliable connections in hobby and repair projects. Standard 60/40 formula. 1.5 oz. #64-002 ..... **1.69**

High-Strength Electrical Tape. Moisture resistant and flame retardant. Has tough 7-mil backing, withstands 0 to 220° F. ¾" × 66-ft. roll. #64-2352, **2.99**



Universal DC Adapter. Plugs into vehicle lighter socket. Selectable 3, 4.5, 6, 7.5, 9VDC output. 300 mA. Six Adaptaplugs. #270-1560 ..... **12.99**

Three-Pin XLR Plug. Use in balanced mike hookups for long cable runs in public address (PA) systems and audio mixers. #274-010 ..... **3.59**

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As several other broadcasters have done, in 1993 Radio Netherlands began renting time on transmitters in the former USSR. It is now relayed via Dusdhambe, in Tadzhikstan, and via Irkutsk and Petropavlovsk Kamchatska in Russia.

Radio Netherlands Programming

Tune in Radio Netherlands this evening and you'll find a first-rate offering of programs. Depending on the day of the week, here are some of the features you'll hear:

Newsline—A 14-minute in-depth look at a particular event, issue, or other topic of interest. The show has recently featured such subjects as *The Working Mother* and *Education for the Future.*

Research File—A show that examines science and its applications for today and for the future. The show has recently covered topics like *Understanding Scientific Facts and Figures, The Office of the Future*, and *The Moon Program.*

Let's Get To Business—This takes a look at the business world but leaves the stock quotes to others.

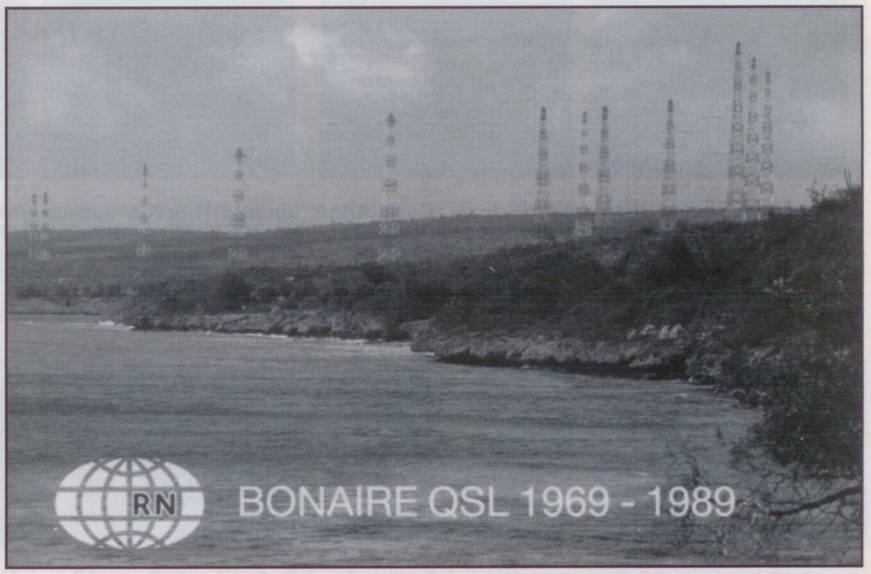
Media Network—Jonathan Marks hosts a weekly look at news of world broadcasting, computer communications, satellites, and more. His program easily ranks as one of the top shows of its kind anywhere. If you're interested in any form of electronic communications, it's not to be missed.

Towards 2000—A regular look at the the ongoing social changes occuring around the globe.

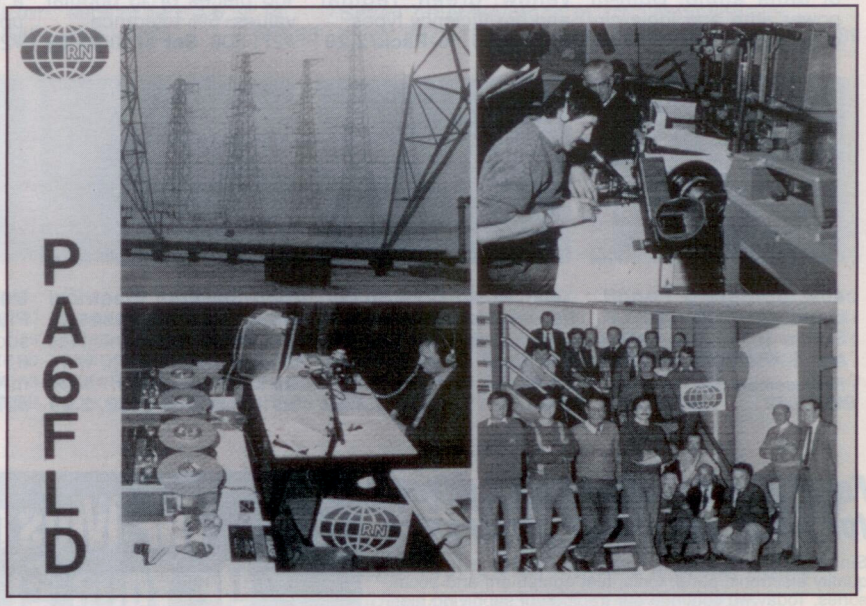
East Of Edam—Featured are unusual interviews, music, and more. There's a wide variety of short series on many different subjects, places, and events (some lasting for only one or two shows, others for 10 or more weeks). The months ahead will bring shows on growing up, parenting, the Holland Festival, Dutch cities in 1944-45, and one called, *Yours, Anne* (about Anne Frank), and many more.

Another program bears special mention: *The Happy Station*. This Sunday feature has more history than any other program on shortwave—it began in 1928! Eddy Startz made the program into one of the most popular offerings on the international radio bands with his focus on music, humor, folksy comments, and greetings to listeners around the world. Startz hosted *The Happy Station* show for 42 years! He was followed by Tom Meijer, but he only held the reins for a mere 22 years! The current host, Pete Meyers, came to Radio Netherlands from the BBC and took over *The Happy Station* in 1992. So, over a period of 66 years, only three people have hosted *The Happy Station*!

General information about upcoming programs is broadcast just before the end of each Radio Netherlands transmission. You can also receive "On Target," the station's full-color program brochure. It provides information about upcoming features and includes the current time and frequency schedule. It's published each March and September.



Part of the Radio Netherlands relay station on the island of Bonaire.



A special amateur radio station, PA6FLD, was on the air from Flevo during the dedication of the 500 kW Flevo transmitters in 1985.

Get in Touch

Listener relations is another area in which Radio Netherlands excels. The station loves to hear from its audience and welcomes feedback about its programs, questions, and suggestions for future programs. The address for Radio Netherlands is P.O. Box 222, 1200JG Hilversum, The Netherlands. You can also fax them at +31 35 724352 or call comments and suggestions to their 24-hour automatic listener line at +31 35 742222. Electronic messages about programs in the English service may be sent through FidoNet, Compuserve, and Internet (all MCI mail) to Jonathan Marks. His account number is 338-2983.

Radio Netherlands is well-known for the excellent printed information from various publishers that it makes available to shortwave listeners. It offers a series of leaflets and booklets covering receivers, as well as books and other printed materials about radio topics, such as how to "DX" areas of the world. You can write the station for a complete list.

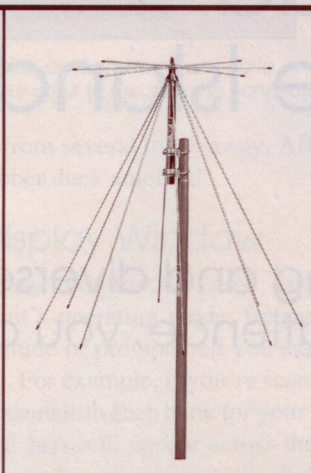
If you like getting QSL cards (verifications), Radio Netherlands will be happy to send you one. Just be sure you've included your name and address, plus the time, date, frequency, information about reception quality, and a description of the programs you heard. Also include some comments about the program and request a QSL card.

If you're new to the shortwave bands and haven't enjoyed Radio Netherlands, give 'em a try tonight! ■

Here's the current, complete Radio Netherlands schedule of worldwide shortwave broadcasts. Times are in Co-ordinated Universal Time (UTC). Frequencies are in kHz.

Time	Broadcast Destination	Freq.
0030	North America	6020, 6165, 9840
0030	South Asia	9860, 12025
0130	South Asia	9860, 12025
0230	South Asia	9860, 12025
0330	North America	6165, 9590
0730	Pacific	9630, 9810
0830	Pacific	9810
0830	Europe	5955, 9895
0930	Far East/Pacific	9715, 9810, 12065, 15470
0930	Europe	5955, 9895
1020	Far East & SE Asia	15470, 12065
1130	Europe	5955, 9650
1230	Europe	5955, 9650
1330	S. Asia, Mideast	9890, 13700, 15150
1430	S. Asia, Mideast	9890, 13700, 15150
1530	S. Asia, Mideast	9890, 13700, 15150
1530	Europe	5955
1730	SE and West Africa	6020, 7120, 17655, 21590
1830	SE and West Africa	6020, 7120, 17655, 21590
1930	West Africa	17605, 17655
2330	North America	6020, 6165

(1)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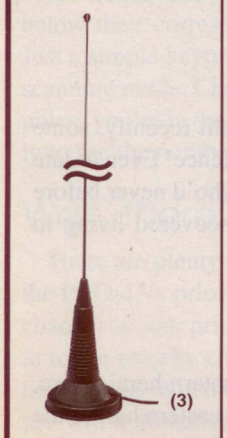
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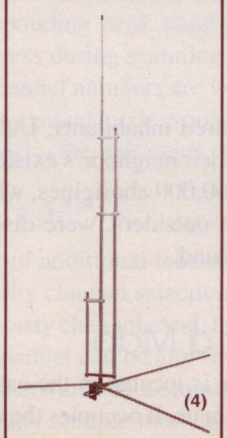
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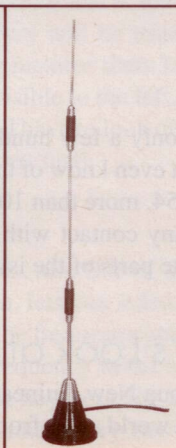
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(1) CROSSBOW® Citizens Band Base Antenna. Radio Shack's best! Omnidirectional ½-wave with efficient 16-foot radiator and rugged fiber glass construction. Fits masts up to 1⅝" diameter. **#21-967 ..... 79.99**

(2) Discone Scanner/Ham Roof Antenna. Receives 25-1300 MHz and transmits on 144, 220, 440 and 1296 MHz amateur radio bands. Accepts PL-259 plug, fits masts up to 1½" diameter. **#20-013 ..... 59.99**

(3) ⅝"-Wave Magnetic-Mount Mobile 2-Meter Antenna. Take your 2-meter handheld on the road! No holes to drill—holds securely to roof, hood or trunk top at highway speeds. 16-foot cable. **#19-210 ..... 39.99**

(4) All-Band Scanner Roof Antenna. Three vertical, three radial elements combine to bring in more frequencies more clearly. Accepts PL-259 connector. **#20-014 .... 29.99**

(5) Magnetic-Mount Mobile Scanner Antenna. Has 16-foot cable with Motorola-type plug. **#20-012 ..... 29.99**

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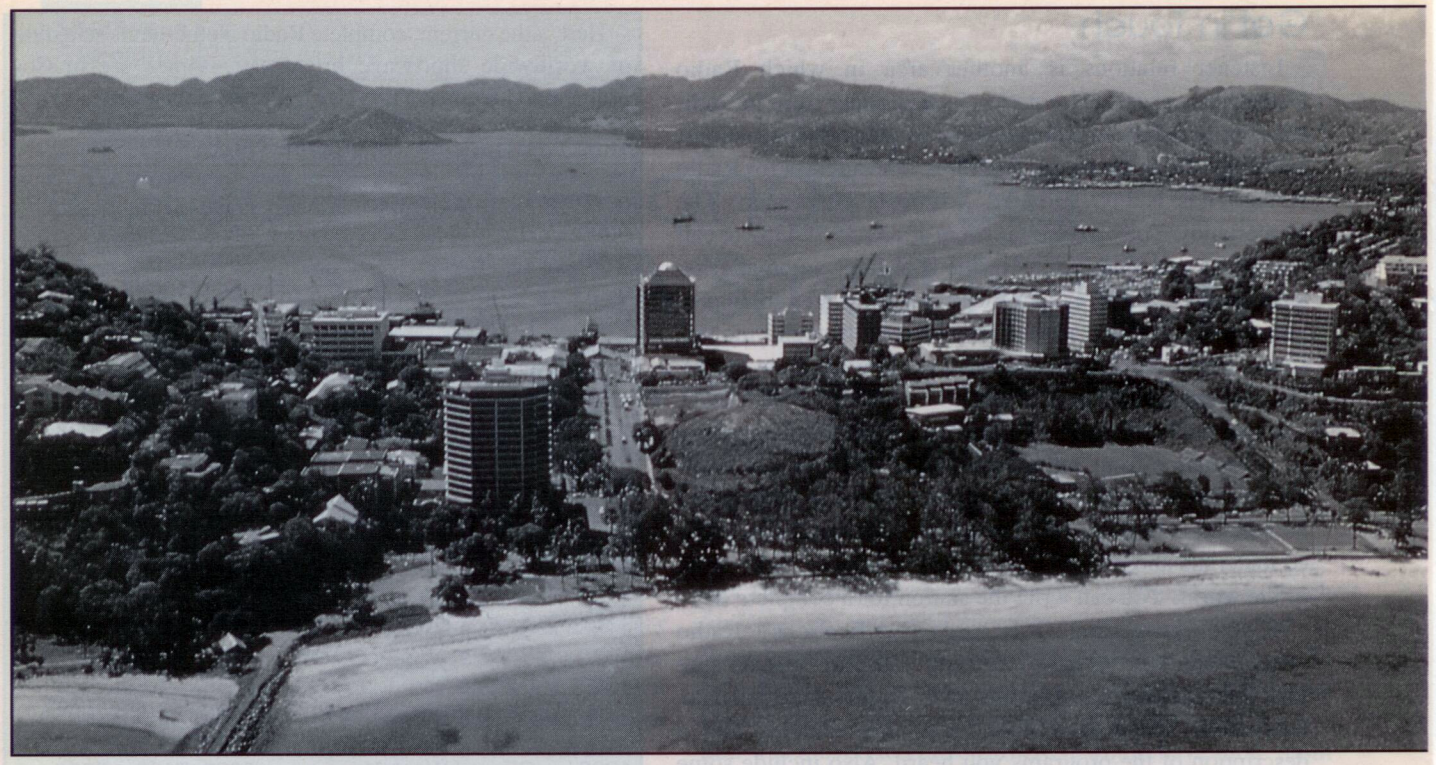


In this land of extremes, the capital, Port Moresby, is a thriving city as shown in this aerial view of downtown...

Listening To Papua New Guinea, The Island Of Extremes

It's one of the most breathtaking and diverse places in the world and, with a little patience, you can hear it on shortwave.

By Harold Ort, N2RLL

Welcome to a world where only a few decades ago headhunting and cannibalism was practiced; a place where you can freeze to death in one part of the country or collapse from heat stroke in another. This is Papua New Guinea, second largest island in the world. It's on the other side of the globe, but luckily, it's easy to explore—through the magic of shortwave radio!

Home to more than four million people and more than 700 different languages, Papua New Guinea is an independent country where many people live in isolated villages, some with only a few hundred inhabitants. Until recently, some didn't even know of their neighbor's existence! Even as late as 1954, more than 100,000 aborigines, who'd never before had any contact with outsiders, were discovered living in remote parts of the island.

Let's Look at a Map

Papua New Guinea is located in the eastern hemisphere, half a world away from us. It occupies the eastern half of the

...But along the Sepik River, villagers still catch fish from their canoes.

island of New Guinea. The western half is Irian Jaya, a province of Indonesia. Altogether, Papua New Guinea comprises more than 600 islands. The larger ones are Manus, New Ireland, New Britain, Bougainville, the West Solomons, and the Bismarck Archipelago.

This "Land of the Unexpected" lies between the equator and Australia. The country is split into 19 provinces, each with its own capital and elected provincial government, headed by a premier.

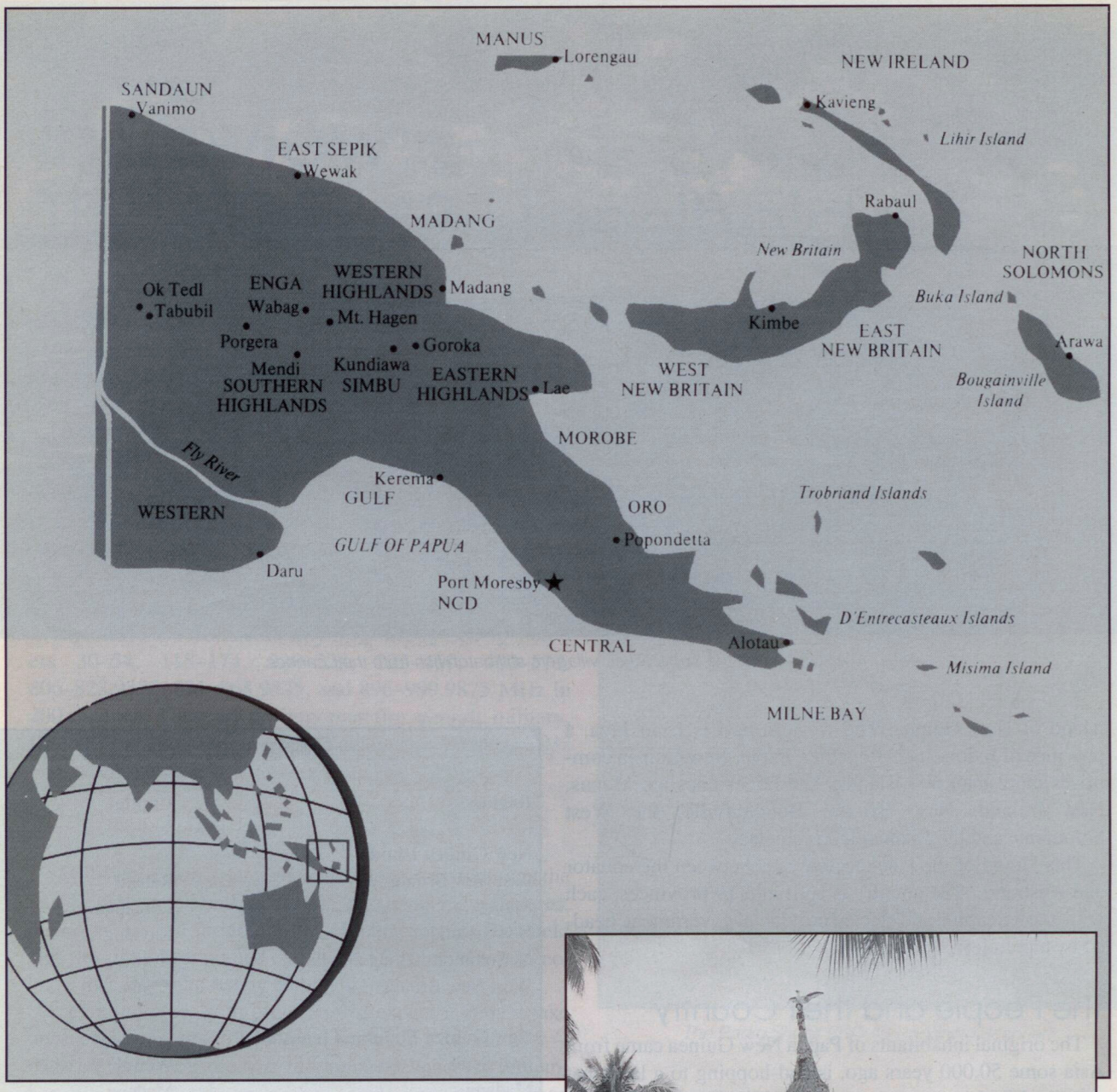
The People and their Country

The original inhabitants of Papua New Guinea came from Asia some 50,000 years ago, island-hopping to a land that remained in the stone age until the 20th Century. Largely because of savage warriors and rugged terrain, seafaring Europeans sailed on by. But, in 1660, the Dutch claimed the territory, naming it New Guinea. Nearly 200 years later, traders and missionaries arrived and, eventually, it was divided into three zones: German, Dutch, and British. Australia was given control of the country by the League of Nations in 1920.

During World War II, Papua New Guinea saw yet another influx of foreigners. Japanese forces invaded, but were met with stiff resistance from American and Australian troops. The Japanese were driven out of Papua by early 1943, less than a year after the invasion, but the Pacific War is not forgotten. Forever-rusting remnants of Japanese and American bombers and ships still lay scattered across the land and surrounding seascape. Some undersea wrecks have yet to be explored by divers.

Geography

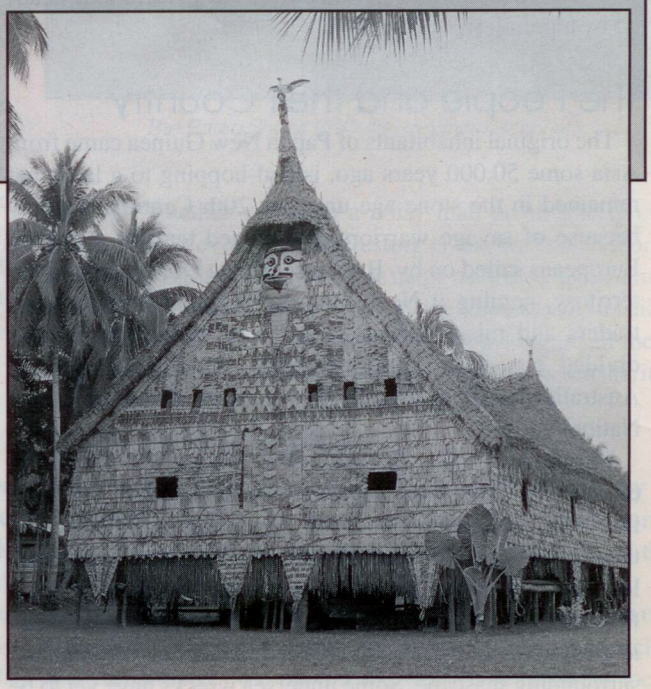
Region	Capital
New Guinea Islands	
East New Britain	Rabaul
Manus	Lorengau
New Ireland	Kavieng
N. Solomons (Bougainville)	Arawa
West New Britain	Kimbe
New Guinea Mainland (coastal)	
East Sepik	Wewak
Madang	Madang
Morobe	Lae
West Sepik	Vanimo
New Guinea Mainland (Highlands)	
Eastern Highlands	Goroka
Enga	Wabag
Simbu (Chimbu)	Kundiawa
Southern Highlands	Mendi
Western Highlands	Mt. Hagen
Papua Region	
Central	Port Moresby
Gulf	Kerema
Milne Bay	Alotau
Oro (Northern)	Popondetta
Western (Fly River)	Daru



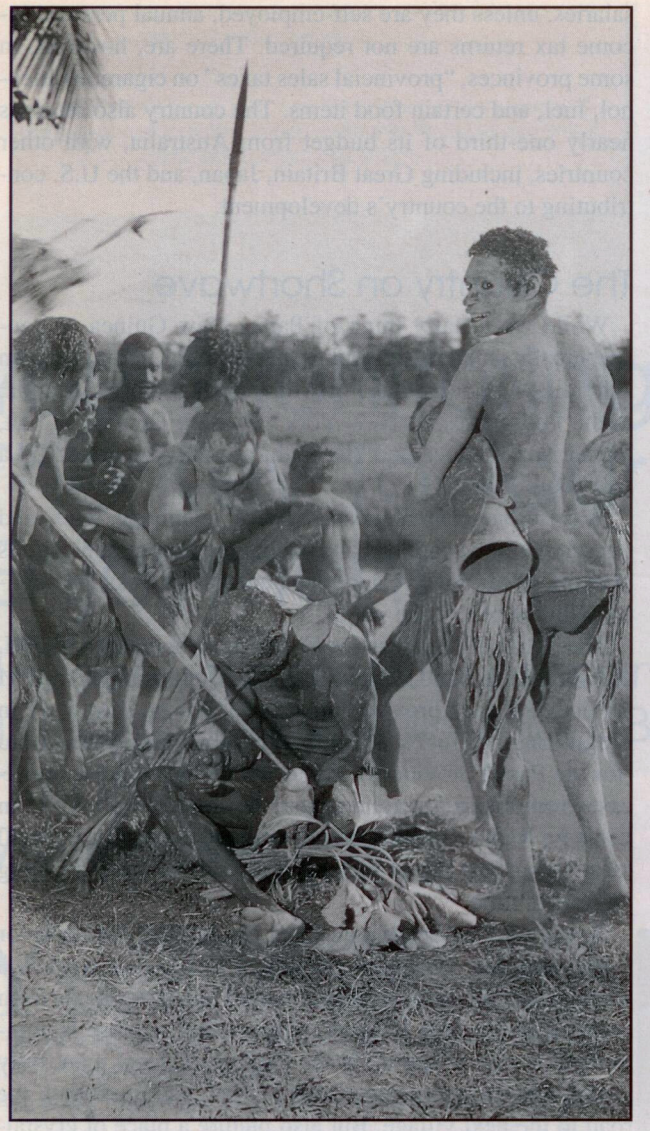
Papua New Guinea on the map.

It wasn't until 1973 that the people of the country gained their independence. Known today as Melanesians, the inhabitants of the Papuan region speak Police Motu, a language used by the Australian administration during the colonial era. In the New Guinea region, Pidgin-English is spoken, which is a mix of local dialects, English, German, French, Portuguese, and Dutch. Although English is the official language of the country, anthropologists claim that one-third of the world's languages are spoken here, largely the result of geographic isolation and rugged terrain.

The country has been called "The Land of Extremes." The mainland geography comprises beautiful open beaches, coastal swamps, fjord-like depths, dry savanna countryside, and steep mountains in the Highlands region. The islands of



A "House Tambaran" or Spirit House in East Sepik Province.



A tribal ceremony near the Sepik River.

PAPUA NEW GUINEA SHORTWAVE STATIONS
(all 10 kW unless otherwise noted)

Station	Freq (kHz)
Radio Western	3305
Radio East Sepik	3335
Radio E. New Britain	3385
Radio Chimbu	3355
Radio Enga	2410
Radio West Sepik	3205
Radio Morobe	3220
Radio W. New Britain	3235
Radio Gulf	3245
Radio Madang	3260
Radio S. Highlands	3275
Radio Central	3290
Radio Manus	3315
Radio North Solomons	3325
Radio Northern	3345
Radio Milne Bay	3365
Radio W. Highlands	3375
Radio E. Highlands	3395
Radio New Ireland	3905
Port Moresby	9675 (100 kW)
Port Moresby	4890 (50 kW, scheduled for operation late July 1994)

(All broadcast from 1530 to 1800 and 0300 to 1000 UTC.)

The beautiful water lily. Its green center is collected by the river villagers for food.

New Britain and Bougainville are home to active volcanoes and have experienced earthquakes registering more than five on the Richter scale.

The wet season is from November to April. Some areas of the country, especially near the City of Lae, receive nearly 14 feet of rain each year. A typical "Highlands cloud cycle" occurs each day. The weather forecast goes like this: clear in the morning with some local fog, followed by increasing clouds and afternoon rains. And talk about humidity! It averages 70-90 percent year-round, with typical temperatures ranging between the same numbers.

An Ancient Culture in Flux

Papua New Guinea is indeed a land of extremes, caught between its historic isolation and the new pressures of the modern world.

For instance, tribal fighting remains a way of life, particularly in the Highlands region. It's used to settle disputes

between clans or village groups. But officials are quick to point out that, "...as a result of bad publicity by the international media regarding tribal fighting and law and order problems in Papua New Guinea, visitors and new residents are bound to be concerned about their safety...fighting is often a localized event and does not concern or involve outsiders, including other Papua New Guineans." Actually, visitors to the country find the citizens particularly friendly; children are especially eager to shout greetings to strangers.

As you might imagine, night life is limited in Papua New Guinea. Good old-fashioned home entertainment is the order of the day. Barbecues, picnics, bridge, chess, model aircraft building, arts and crafts, soccer, softball, and other family-oriented activities and sports abound.

Visitors to Papua New Guinea are able to stay at hotels and guest houses considered good by American standards. Equipped with TVs in urban areas and videos in rural parts of the country, hotels vary from international scale to village guest houses. Papua New Guinea officials report that "while villages will not turn a visitor away, especially if he has a problem of some sort, casual visits are not recommended...."

In many remote areas, village guest houses or mission houses are the only accommodation available. The officials recommend them "for the young and adventurous." Visitors will sometimes be offered gifts and meals—but tipping is *not* an acceptable practice!

Papua New Guinea in a Modern World

Port Moresby, the national capital, is a major seaport that also boasts an international airport, and it handles an ever-increasing tourism industry. Even so, the major industry remains trade. Coffee, cocoa, palm oil, and tea from are exported around the world, along with many spices. The country continues to diversify its economy, providing hardwoods, fish, and sugar. Gas and oil have been found in the Southern Highlands and Papuan and New Guinea island basins, along with numerous mineral deposits, including silver, gold, and copper.

Because of the rugged terrain, there are still regions where roads are few or non-existent. Many areas of the island remain accessible only by air from some 450 registered airfields. Papua New Guinea's national carrier, Air Niugini, and nine other airlines provide valuable links to the entire country. Remote areas also rely heavily on international shipping lines, with coastal shipping responsible for transporting cargo to the rural lowlands and islands. In some places, coastal vessels are the only means of transporting goods like food and fuel.

Naturally, because of the country's distance from major world markets, certain goods, such as men's shoes, are often in short supply or very expensive. Other luxuries include electrical items, and even dishes and cooking utensils.

Could you imagine life without the Internal Revenue Service and April 15? While residents of this island nation also have their personal taxes automatically deducted from their salaries, unless they are self-employed, annual personal income tax returns are not required. There are, however, in some provinces, "provincial sales taxes" on cigarettes, alcohol, fuel, and certain food items. The country also receives nearly one-third of its budget from Australia, with other countries, including Great Britain, Japan, and the U.S. contributing to the country's development.

The Country on Shortwave

While we usually think of Papua New Guinea as geographically isolated, remember that it's only 100 miles from Australia. And its capital, Port Moresby, is as close to Manila, in the Philippines, as New York City is to Denver. In fact, Papua New Guinea and Honolulu are only separated by a few hours' flight.

In the urban centers, postal service, telephone, telex, and fax services are available, and a reliable telecommunications network of microwave and repeater stations links the country with the rest of the world.

The National Broadcasting Corporation operates AM, FM, and shortwave radio stations. Regional stations relay the FM service, and each province also broadcasts on shortwave in Pidgin-English (for New Guinea provinces) and in Hire Motu (for the Papua provinces). Residents receive regular broadcasts from Radio Australia around the clock as well. You can listen for Radio Australia broadcasting to the Pacific on 9580 kHz—your best bet of picking it up will be early morning your local time.

So put on your headphones and put up with the static for a few minutes. Imagine yourself in a different world—a world where men still wear ceremonial headdress made from colorful exotic bird feathers, where tribal warfare is commonplace, and where up in the Highlands, local men, fully armed with bows, arrows, bush knives, and axes walk the road to the next village. But also picture a place of crystal-clear beaches and coral reefs, where tropical breezes blow silently toward the sunset.

Photos courtesy Papua New Guinea Tourism Promotion Authority, Port Moresby. ■

A Look At The Radio Spectrum

The radio spectrum, beginning at about 10 kHz, comprises a large chunk of the overall electromagnetic spectrum. In concert with international law, the Federal Communications Commission (FCC) has further broken down the spectrum into frequency segments, assigning portions to specific users. The following table shows what services are assigned to those segments.

10–150 kHz	Military/government, submarine communications
150–535	Longwave Band. Beacons, foreign broadcast, maritime
535–1700	AM Broadcast Band. (recently extended to 1700 kHz)
1700 kHz–30 MHz	Shortwave/High Frequency Band. Broadcasting, two-way government, military and commercial communications, amateur radio, others.(See "Shortwave Close-Up" feature)
30–50	Very High Frequency Band. Government, business, walkie-talkies, and cordless phones
50–54	Amateur radio 6 meter band
54–72	TV Channels 2-4
72–76	Manufacturing, remote control, eavesdropping bugs, etc.
76–88	TV Channels 5-6
88–108	FM Broadcast Band
108–136	Aeronautical communications
136–138	Satellites
138–144	Military communications
144–148	Amateur radio 2 meter band
148–150.8	Military use
150.8–174	Business, highway, law enforcement, government weather, maritime
174–216	TV Channels 7-13
216–220	Maritime and aeronautical
220– 222	Land mobile communications
222–225	Amateur radio
225–400	Military aviation and space
400–406	Military and government
406–420	U.S. Government
420–450	Amateur radio
450–470	Ultra High Frequency Band. Business,industry, military, fire, government
470–512	TV Channels 14-20, shared with law enforcement
512–825	TV Channels 21-69
825–849	Cellular telephones
849–851	Aeronautical telephones
851–866	Business, public safety
866–869	Public safety, law enforcement
869–894	Cellular telephone systems
894– 896	Aeronautical telephones
896–901	Private land mobile units
902–928	Land mobile, amateur radio, personal communications units
928–932	Radio paging
935–940	Business radio
941–944	Government and non-government fixed services
944–952	Broadcaster's studio-to-transmitter links
952–960	Private fixed services, paging
960–1240	Aeronautical navigation
1240–1300	Amateur radio
1300–1350	Aeronautical navigation
1350–1400	Radio location
1400–1427	Radio astronomy
142–1429	Point-to-point, mobile, space
1429–1660.5	Various satellite transmission uses
1660.5–1668.4	Radio astronomy
16668.4–1700	Meteorological aids
1700–1850	Meteorological satellites, U.S. government
1850–1990	Fixed point-to-point, microwave
1990–2110	Broadcast studio-to-transmitter links

Pirate Radio

The listening fare is as varied as you'll find anywhere. While pirating is illegal, listening isn't....

By Andrew Yoder

On a briskly cold hillside, two young men stand, shrouded in darkness. One raises an arm and turns on the backlighting of his LED watch. "Two minutes," he says while the other man opens the car door and turns a 25-year-old DX-60B to the standby position. Both men unwind cables, plug them into respective positions of their mixer. One turns the DX-60B to the phone position, the other hits play on a cassette deck, and the theme from "Masterpiece Theater"—interspersed with mooing cows—booms through a monitor receiver. Meanwhile, a hardcore group of radio listeners, from as far away as 1500 miles, sits glued to their radios, copying down every last detail through the static.

This is a fictional account of a pirate radio station signing on the air in North America, but similar sign-ons have been repeated hundreds of times in the past decade. Just over 15 years ago, there was only a handful of these unlicensed, "pirate" operators to tune in to. Through the efforts of such stations as the Voice of the Voyager, Voice of Venus, WFAT, and KPRC, a small underground radio movement began, and, by the late 1980s, Radio Newyork International's brief offshore exploits were splashed across the front pages of national newspapers.

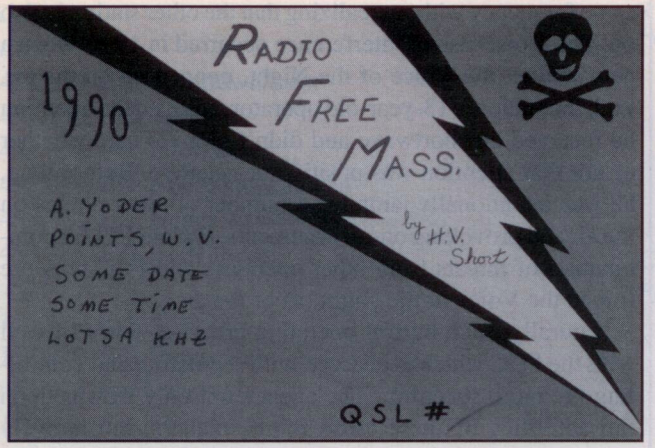
Today, pirate radio remains pretty much underground. The movie "Pump Up The Volume" with actor Christian Slater, however, has spawned a new interest in community FM pirate radio. This, coupled with new, inexpensive transmitter technology, has helped FM "microbroadcasters" spring up across the country—providing listeners a fertile tuning ground. Even some commercial broadcasters have adopted the "Jolly Roger" theme in the hopes of drawing in new advertising dollars. Station KQLZ, a top-rated commercial FM broadcaster in Los Angeles, added the "pirate radio" slogan for a time, and one commercial FM station in Philadelphia even cruised the suburbs in a huge black "pirate ship" camper.

Radio USA airs all kinds of programs.

Local Broadcasters

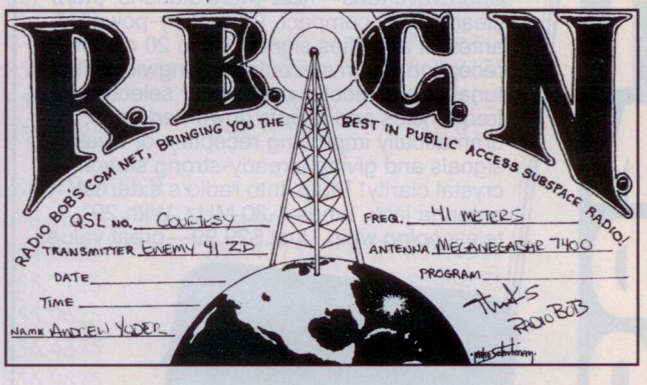
Literally hundreds of low-power AM and FM broadcast band pirates are semi-active across the U.S. Many of them broadcast unnoticed, however, heard only by a handful of the operators' friends. Often the stations have tiny broadcast ranges and are relatively inactive. Also, the fact is that few people scan the broadcast bands in search of new radio stations. This combination usually dooms a broadcast band pirate to a sentence of total obscurity.

The local broadcast band pirates who've achieved notoriety have done so as the result of either a large publicity campaign or a duel with the FCC. In many cases, both have



◄A QSL card (left) from Radio Free Mass.

▼A QSL card (below) from Radio Bob's Com Net.



occurred. Three of the most widely known FM pirates in North America are Free Radio Berkeley from Berkeley, California; Black Liberation Radio from Springfield, Illinois; and KAPW from Phoenix, Arizona.

These three stations are similar in the sense that they all operate with low power (under 10 watts), have all been fined by the FCC, all solicit programming tapes from listeners, and all call for a grass-roots radio movement. Station KAPW was closed down in 1992 and has apparently run out of funds to pay off legal fees (which can be substantial!). Black Liberation Radio has been broadcasting regularly for several years and went to a 24-hour a day, seven-day a week format about a year ago. It publishes a regular newsletter, has produced its own video, and is in the process of setting up a Black Liberation Television station. Black Liberation Radio has also recently been sent a Notice of Apparent Liability from the FCC, so its future is uncertain.

Today, Free Radio Berkeley is riding the highest crest of mass media notoriety. The main operator has been an organizer of political protests in the Berkeley area since the late 1960s. As a result, the station's anti-corporate approach is highly organized and powerful. Free Radio Berkeley is the driving force behind the growing California pirate radio scene. Future plans for Free Radio Berkeley? Embarking on shortwave broadcasting.

Shortwave Pirates

For the listener, shortwave radio is the prime hunting ground for pirates. Here, a small station can be easily heard across a large portion of North America. Although a number of different frequencies have been tested, the present favorites are 7415, 7465, and 15050 kHz (+/- 5 kHz). In general, the best time to listen for pirates is in the 1900-2300 UTC range for 15050 kHz and in the 2000-0400 UTC range for 7415 and 7465 kHz. During the summer months, most of the pirate broadcasting occurs after 0000 UTC. During late afternoon in the colder months, however, you'll usually fine solid frequency signals within 500 miles of the transmitter site at 7000 kHz.

A number of people may wonder why certain frequencies, particularly those near 7400 kHz, are often home to pirates. The 6200- to 6400-kHz area has been used for decades by pirate radio stations in Europe. Their North American counterparts used these frequencies until about about 15 years ago, when it was found that some ship-to-shore stations operated in this area. Later, stations increasingly began using frequencies in the 7350- to 7500-kHz area. Presumably, this region became a favorite haunt because many amateur radio transmitters naturally cover this territory and since many licensed American stations also operate here. Furthermore, it's near the highest frequency range that is active at night, allowing for good coverage and the ability to operate under a cover of darkness.

Unfortunately for listeners in the West and South, most of the shortwave activity is in the Northeast, in a triangle running roughly between Baltimore, Cleveland and Boston. Although even listeners as far away as Vancouver, Canada, can hear most of the North American shortwave pirate activity, the signals are generally weak and bogged down by static. Still, with the wonders of shortwave propagation, listeners in any part of the country can at least hear fair signals from pirate stations.

Types of Programs

As you might expect with such a potentially diverse group of people, there is no set format for pirate radio stations. The music ranges from old-time country and western to punk rock. The politics and religious opinions are equally varied. And the signals, technical standards, and production all range from excellent to poor (see the "Station Sampler" at the end of this article).

As you can probably guess, the primary draw for listeners is to hear these alternative radio formats. The challenge—and excitement—in tuning pirate radio stations arises from their relative rarity.

Pirate Radio and the Law

While the pirate radio community generally operates in a constructive manner and tries to air entertaining and informative programming, there have been instances of interference. Usually, when interference occurs, two pirates air programming simultaneously on adjacent channels or on the

INDOORS

Amplified antenna packs a punch!

Shortwave fans—hear more stations, more clearly! This compact, 9V battery-powered antenna amplifies signals up to 20 dB for reception that rivals outdoor longwires. Its tunable preselector *peaks* your selected frequencies and *rejects* unwanted ones, dramatically improving reception of weak signals and giving already-strong stations crystal clarity! Plugs into radio's external antenna jack, tunes 4-30 MHz. With 29" telescoping whip. Just $29.99—great value!

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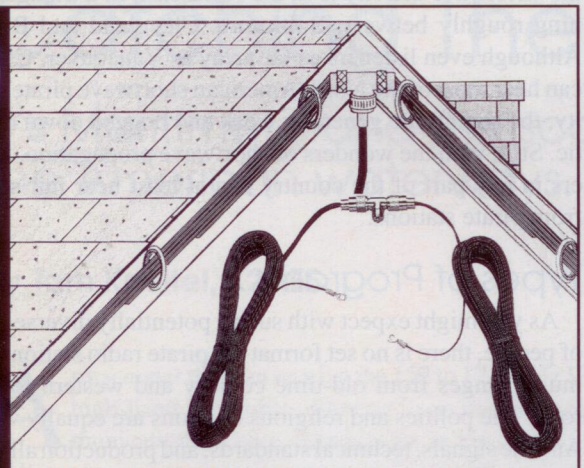


"Inverted V" shortwave antenna

World-band DXers—now hear what you've been missing! This multiple-dipole antenna is design-optimized for outstanding reception of all shortwave broadcast bands. No matching, no power source required—it's equivalent to over 190 feet of wire, yet just 65 feet in total length. Mounts easily on roof eaves or a single mast, and accepts a PL-259 plug so you can connect it to your receiver with low-loss coaxial cable. A terrific value—just $39.99 at your nearby Radio Shack.

WE BRING YOU THE WORLD.

Radio Shack®

same frequency without realizing that the other station is also on. The worst case of interference occurred in 1992, when a new station, the Voice of the Night, popped up on the air. Lad, the station's 13-year-old operator, enjoyed the attention he received on shortwave and didn't seem to care whether or not that attention was positive or negative. Before long, he was intentionally jamming a number of other pirates on the air and provoking on-air arguments. By late 1992, a combination of threats from other operators and FCC pressure forced the Voice of the Night off of the air.

Naturally, such hurtful operating practices don't sit well with the FCC which is charged with regulating and controlling the radio spectrum. The agency not only frowns upon the activities of these radio merry makers, but actively attempts to close the pirates down. And the fines levied by the FCC for operating a pirate radio station currently amount to about $8,000!

The Voice of the Night serves as a perfect example of why these broadcasts are illegal. But pirate radio stations will no doubt continue to risk huge fines to broadcast to the masses. Although it violates federal administrative rules to broadcast, and we certainly don't recommend it, it's certainly legal to listen. There is plenty of pirate action on the airwaves—be sure you don't miss it! ■

A Station Sampler

A number of stations with interesting and diverse programming can presently be heard:

Captain Eddy's Radio Airplane regularly broadcasts programs of 70s rock that are packed with quality home-grown comedy.

WEED claims to "broadcast from the great southwest" with programs of brief pro-marijuana commentaries with well-mixed political audio bites and rock song clips.

WLIS ("We Love Interval Signals") bases its format on interval signals from around the world.

The North American Pirate Radio Relay Service (NAPRS) relays programming from other broadcasters.

P.J. Sparx of WREC (Radio Free East Coast) and *Captain Crook of WJLR (John Lennon Radio)* mostly play a variety of music for their listeners.

He Man Radio, with the ever-powerful He-Man, broadcasts skits and assorted tales of masculinity in "the manliest of all modes," upper sideband.

CSIC, with Pirate Rambo, Canada's most active pirate covers the gamut—from relays and commentaries to music and comedy.

Radio USA airs its unique home-produced comedy skits, punk rock music, information segments, and commentaries all "from a leaky bathtub."

CRSM (Radio Scottish Montreal) features Scottish music, Scottish cultural events in Montreal, and Scottish politics.

Radio Gumby International broadcasts brief programs of talk and old episodes of the Gumby television animated series.

The Ground Level Network with announcer, Just Bob, features health tips from medical journals and a touch of light pop music.

In Review: The Radio Shack Amplified Antenna

By Bill Orr, W6SAI

If you're a shortwave enthusiast, you probably know that portable receivers with whip antennas do a pretty good job on the loudest shortwave signals. But you also know that they can't equal the performance of a good, high outside antenna. So, what to do?

Well, an active, indoor antenna may be just the answer. These are short whip antennas electrically matched to a high-gain amplifier. The Radio Shack Indoor Amplified Shortwave Antenna (20-280) is just such a device, and it will appeal to anyone who wants to improve reception.

The Amplified Antenna tunes shortwave from 3 to 30 MHz in two bands and has a peaking control to boost the desired signals. It's connected to the auxiliary antenna jack of a portable receiver with a short coax line and gets its power either from an internal 9-volt battery or an AC adapter.

Does it work? Yes, it does. I compared reception of long-distance shortwave broadcasters using the Amplified Antenna against both a 40-foot long indoor antenna, eight feet above ground, and a 100-foot outdoor antenna, 30-feet high.

And the results? The Amplified Antenna was not as good as the big outdoor antenna, but much, much better than the smaller indoor antenna. All but the weakest signals heard on the big antenna could be heard on the Amplified Antenna, and many weak signals heard on the Amplified Antenna could not be heard on the indoor wire antenna. Granted, this isn't a very scientific test, but it is a practical one!

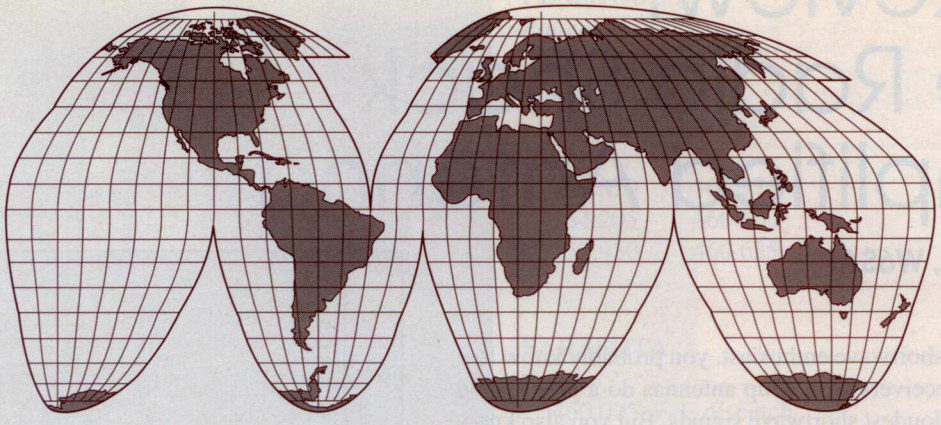
Of course, neither the Amplified Antenna nor any other indoor wire antenna works well in a concrete or steel-frame building. In addition, any indoor antenna is bound to pick up locally-generated radio noise, like light dimmers, computers, electric motors, and TV sets. In my case, I had to position the Amplified Antenna carefully with respect to my receiver, as the Amplified Antenna picked up the digital counter circuits in the receiver, especially when it was placed near the frequency readout display. But that was a defect of the receiver, not of the Amplified Antenna! Moving the antenna away from the receiver helped.

I didn't experience any problems from receiver overload or blocking from strong local broadcast band stations, as I thought I might. Local radio noise from appliances in my house, however, was more noticeable with both the Amplified Antenna and the indoor antenna. Sometimes tilting the whip antenna from the vertical position improves reception by reducing local noise, so proper positioning is important.

Unfortunately, the Amplified Antenna's case does not permit the unit to stand steadily in an upright position because the bottom of the enclosure is slightly rounded. Like any such antenna, this one should be placed near the receiver so that it can be easily tuned along with a receiver frequency change. No problem, but the antenna is likely to topple over when you adjust it. A small, portable stand to hold the unit would solve this dilemma.

The Radio Shack Amplified Antenna tunes shortwave from 3 to 30 MHz in two bands and also offers a peaking control to boost the desired signals.

Despite these minor drawbacks, the Amplified Antenna is a good answer for the shortwave enthusiast who can't erect an outdoor antenna and who feels the whip antenna on his or her portable is inadequate. The bottom line: the best shortwave antenna is a high, long outside wire, free and clear of nearby objects. But, if you're limited to an indoor antenna, this one is a good choice. Even some listeners with a good outdoor antenna may want to use the Amplified Antenna as an alternative in a difficult receiving situation. At a price of only $29.99, I say—check it out! ■



Best Bet Shortwave Broadcasts In English

For most people, listening to foreign broadcasts is the biggest lure of shortwave listening. To get you started on the international listening scene, we've provided a listing of some of your "Best Bets." These are stations that you're likely to be able to pick up and that broadcast at least some of the time in English.

How well you receive stations on this list will vary with atmospheric conditions, seasonal changes, your listening location, and receiving equipment. Stations may also make changes in the times and frequencies of broadcasts with little or no advance warning. Not all of the frequencies listed for a particular broadcast will provide equally good reception; some frequencies may not even be in use. Stations may also have other frequencies in use at the times listed here. Many stations are also on the air at other times and on other frequencies. Some broadcasts are on weekdays only or are not on the air daily. Most station schedules are too long and complex to be included here.

We have provided a general grading to give you some idea of what kind of reception you may expect from each station, based on the use of an average portable receiver under normal propagation conditions. One is poor, two is average, three is good. Listeners in the western part of the U.S. will generally get better reception from Asia and the Pacific than will listeners in the east. Conversely, those in the east will enjoy better reception from stations in Europe and Africa.

Times indicated are UTC (Coordinated Universal Time), a 24-hour universal time system which is five hours ahead of Eastern Standard Time, i.e. 0000 UTC equals 7 p.m. EST, 6 p.m. CST, 5 p.m. MST and 4 p.m. PST. All broadcasts listed are in English, and on average, represent time and frequency combinations which should provide best reception.

Station	Time	Frequencies	Grade
R. Tirana, Albania	0130	9580	**
RAE, Argentina	0100	11710	**
R. Australia	morning	9580, 11660, 11800	***
R. Austria	0530	6015	***
R. Vlaanderen, Belgium	0030	5900	*
Radiobras, Brazil	1200	15445	*
R. Bulgaria	0100	7455, 9700	**
R. Canada	2300	5960, 6120	***
CFRB/CFRX, Canada	24hrs	6070	**
China Radio	0000	9780, 11715	**
R. For Peace, Costa Rica	24hrs	7375, 9375	**
Croatian Radio	0500	7315, 9495	*
R. Havana, Cuba	00-0700	6010, 9510	***
R. Prague, Czech Repub	0100	7345	**
HCJB, Ecuador	0030	9745	***
R. Cairo, Egypt	0200	9475	*
BBC, England	24hrs	5975, 7325, 9410, 9590, 15220, 15260	***
R. Finland	1230	15400, 17740	**
R. France	12,14,16	13640, 17620, 17650	**
Deutsche Welle, Germany	01, 03, 05	5960, 6040, 9670	***

Station	Time	Frequencies	Grade
V. of Greece	0140, 0330	9380, 9420	*
R. Cultural, Guatemala	0300	3300	*
NBC, Papua New Guinea	1100	9675	**
R. Budapest, Hungary	0300	9835	*
All India Radio	2100	11620	*
VOIRI, Iran	0030	9022, 11790	*
Kol Israel	0500	9435	**
RAI, Italy	0100	9725, 11800	**
R. Japan	0300, 1100	5960, 6120	***
R. Korea, S. Korea	1200	9650	*
R. Kuwait	1800	11990	**
R. Vilnius, Lithuania	0030	7150	**
R. Netherlands	0030	6020, 6165, 11655	***
R. New Zealand	0600	9700	**
V. of Nigeria	0500	7255	*
R. Norway	1200 Sun	15230, 17740	**
R. Portugal	0200	9570, 9705	**
R. Romania	0200	6155, 9510	*
R. Moscow	12-0700	7165, 7180, 9685, 12050, 15425, 17665	**
R. Singapore	1100	9530	*
Slovak R., Slovakia	0100	5930, 7310, 9810	*
Channel Africa, S. Africa	0500	9695	*
R. Sweden	0330	9850	**
Swiss Radio	0100	6135, 9885	**
V. of Free China, Taiwan	0200	5960, 9680	***
V. of Turkey	2300	9445	**
R. Ukraine	0100	7195	**
V. of UAE	0330	11945, 13675, 15430	**
Voice of America	24hrs	5995, 9760, 13710, 15205, 15580	***
Vatican Radio	0250	7305, 9605	**
R. Nacional, Venezuela	0055	9540	**
R. Yugoslavia	0100	6190	**

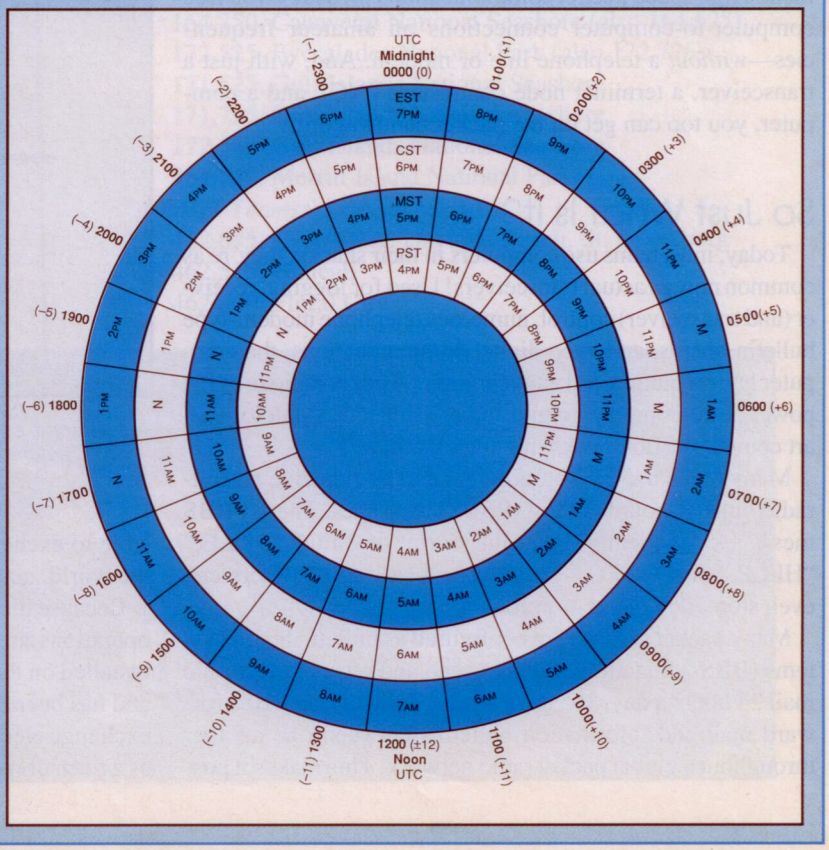
World Time

Listening to international broadcasters gives you a fascinating opportunity to "hear the world." And knowing a little bit about World Time makes the hobby even more enjoyable.

Most international broadcasters use the 24-hour time format, usually refered to as Coordinated Universal Time (UTC), and formerly called Greenwich Mean Time (GMT). The UTC system was adapted to keep world broadcasters and their distant audiences on a "universal" time schedule. Five hours ahead of EST, and centered on Greenwich, England, UTC makes listening to shortwave a breeze.

It works like this: If your favorite international shortwave station begins a broadcast at 1400 UTC, by using our UTC to USA time zone conversion circle, you'll immediately know to tune in at 9 a.m. EST, 8 a.m. CST, etc.

Universal time is the same anywhere on the globe. Whether you're in New York or Siberia, 1400 UTC is 1400 UTC. So early some morning when you hear the Radio Australia announcer on 9580 kHz say, "It's 1200 UTC," you'll realize it's done for your convenience. Then you can use this handy UTC to USA time zone conversion circle to give you UTC at a glance.

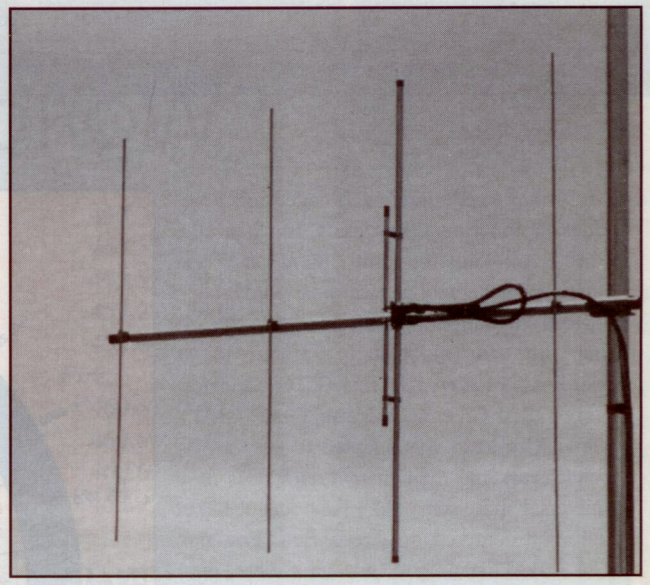


Packet Radio—A Beginner's Guide

What's all the racket about packet? Just that it's one of the most exciting forms of amateur communications, that's what!

By John A. Magliacane, KD2BD

Packet radio has exploded in popularity over the past decade. Today, packet activity exists on just about every populated amateur band, from HF through the microwave region. One reason it's so popular is that it's the perfect marriage between computers and ham radio equipment. High speed packet communications provide error-free computer-to-computer connections on amateur frequencies—*without* a telephone line or modem. And, with just a transceiver, a terminal node controller (TNC), and a computer, you too can get on the packet bandwagon!



An antenna such as the Cushcraft 124WB is an ideal packet antenna. (Photo courtesy Cushcraft Corporation.)

So Just What Is It?

Today, most hams use computers in their shacks; they're as common now as actual transceivers! Used for logging, receiver (and transceiver) control, numerous telephone modem-type bulletin boards, and even digital communications, the computer has revolutionized amateur radio. Packet radio uses the power of the computer to give today's amateur a state-of-the-art communications link with other hams.

Many hams use packet radio to send and receive packet-radio bulletin board system (PBBS) messages. These PBBS messages frequently take the form of "FOR SALE," "HELP," and "INFO," requests and responses. Users can even store, download or upload these files.

Many packet stations are configured as bulletin board systems (BBSs) that allow users to send and receive electronic mail 24 hours a day, 365 days a year. Full-service BBSs forward mail and information bulletins between one another throughout a global packet radio network. This makes it possible to exchange electronic mail messages with anyone in the world...and beyond.

Because the network is wireless, portable and even mobile operations are possible. In fact, a packet radio station was installed on the Russian space station, Mir, in February 1991 and has been active ever since! It allows the Cosmonauts to exchange electronic messages with hams on the earth below as a form of recreation. Packet radio is also included in many

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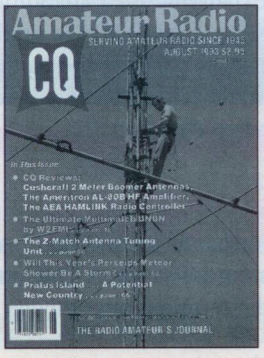
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This Advanced Electronic Applications, Inc. TNC, the PK-96 Packet Controller is a high-speed packet controller with numerous features. (Photo courtesy AEA.)

SAREX (Shuttle Amateur Radio EXperiment) packages carried on U.S. Space Shuttle missions. Receiving these transmissions directly from space thrills thousands of packet enthusiasts and school children around the world.

Packet's Beginnings

But just how did all this racket over packet come about? Amateur packet radio got its start in Vancouver, British Columbia. Back in 1978, Doug Lockhart, VE7APU, began experimenting with bit-oriented packet radio communications. Lockhart also developed the first TNC, a special-purpose computer that was used to assemble information packets upon transmission and disassemble them upon reception. He went on to found the Vancouver Amateur Digital Communications Group (VADCG) that helped promote packet radio experimentation throughout North America.

In 1980, packet radio experimentation was taken up in the U.S. As its popularity grew, networking conferences were held to decide on protocol and hardware standards for amateur packet radio communications. By the early 1980s, the Tucson Amateur Packet Radio (TAPR) Corporation was formed as a non-profit organization dedicated to the advancement of amateur digital communications and began offering TNC kits for experimenters.

The TAPR TNC soon became the accepted standard, and commercial manufacturers of amateur radio equipment started offering packet radio TNCs patterned after the TAPR model. As interest in packet radio grew, so did a global network of packet radio store-and-forward stations that allowed error-free digital communications through the world. Amateur radio operators jumped onto the packet radio bandwagon in droves, and the rest, as they say, is history.

Today, many tens of thousands of packet radio BBSs, packet nodes, and digipeaters (digital repeaters that handle packet communications) allow global communications using packet radio techniques. There's also a cluster of Orbiting Satellites Carrying Amateur Radio (OSCARs). These carry packet radio transponders that act as "flying mailboxes" and file servers in space, further expanding the capabilities of packet radio communications. Several OSCAR satellites also carry TV cameras that snap pictures of the earth and transmit the images to ground stations via packet radio communications protocol for error-free data transfer.

A Typical Packet Station

The typical packet radio station has an unmodified 2-meter FM transceiver and antenna system as its core. A TNC attaches between the transceiver and a terminal or computer run-

ning terminal emulation software. This provides keyboard communications with the TNC through the computer's serial port. Station performance relies heavily on the transceiver and antenna system used. While 2-meter FM voice communications is a strong signal mode, amateur packet radio is even stronger and typically requires a signal strength capable of producing at least 25 dB of receiver quieting.

Typical Packet Communications

It is possible to "connect" with another packet radio station and carry on a keyboard-to-keyboard chat, but most stations connect to BBSs. These allow them to send and receive electronic mail messages from other hams around the world, read and respond to open messages addressed to all hams, or read news bulletins, such as those generated by the ARRL (American Radio Relay League), AMSAT, and other groups and individuals.

Many BBSs transmit what are known as "beacon" packets which provide some information about the BBS and alert users that mail is waiting to be read. A mail beacon might look something like this:

N2KZH-4>MAIL:
21-Mar 20:45 << PBBS N2KZH-4 Howell NJ >> 2121 active messages.
<< 1994 Callbook ON-LINE >>
Mail for:
{K2AWE KB2MMR KD2BD N2KZH N2LDU N2SMT KB2OPQ N3MXJ NM2I WA2UDV WB2DIN}

Some BBSs include a "callbook" function that allows users to look up licensed amateur radio operators through their call sign. A "White Pages" function is also sometimes included which gives users access to a database of hams who are active on packet radio. The information a White Pages server provides usually includes the "home BBS," or packet address, where the person in question can be reached via packet mail.

Packet radio BBSs frequently carry thousands of active messages in addition to private e-mail. Here's how a short listing of messages typically found on packet radio BBSs would appear:

Msg# TSLD Dim To @ BBS From Date/Time Title (LC-choice: *)
77287 B$L 3824 NEWS @AMSAT KD2BD 0325/1858 * SpaceNews 28-Mar-94 *
77285 B$ 3517 RTTY @WW LA5ZO 0325/1802 Info about ST-16 Interface ???
77284 BF 859 EZSATS@USBBS N9LTD 0325/1759 US West hamsat times 03/28-04/
77283 B$ 2997 INFO @WW DL2SEO 0325/1759 ? info abt cordless headphone
77282 B$ 1296 DX @WW IV3BKC 0325/1756 D44AB qsl-info pls!!!!
77281 B$ 1494 HELP @WW IK3NLK 0325/1753 Anybody help me?
77280 B$ 2032 SCOUTS@WW IW1QEL 0325/1751 SCOUT AWARD
77279 B$ 5364 ALL @WW IW0DNN 0325/1750 **** CQ.CQ.CQ. FROM ITALY ****
77278 B$ 4771 VR @WW HA8KCI 0325/1748 Virtual Reality.....
77277 B$ 2036 PRO @WW DA4RO 0325/1743 NEED MODS FOR PRO-35
77276 B$ 1542 DXNEWS@WW DL1GRO 0325/1742 QSL INFO
77275 B$ 2675 ALL @WW HA5CMM 0325/1742 I'D LIKE PENFRIENDS!!!!!!
77274 B$ 1384 INFO @WW 9A3HJ 0325/1740 Need information: Needlepoint.
77273 B$ 1209 DXINFO@WW IV3TMM 0325/1740 Need CO7KR qsl manager
77272 B$ 6331 SWLS @WW JR9MFK 0325/1738 Radio Japan Sked.(M94-2/J94)(1
77271 B$ 1408 BPQ @WW IW2FPO 0325/1736 FBB Broad & BPQ+THENET ?
77270 B$ 7727 VHF6 @WW P29CW 0325/1736 6 Meter report, 16 March, 1994
77269 B$ 1188 YAESU @WW JP1LRT 0325/1731 RE:HELP FT-2400 2m VHF(4S7NR)
77268 B$ 6374 SWLS @WW JR9MFK 0325/1730 Radio Japan Sked.(M94-2/J94)(3
77267 B$ 2024 GND @WW DU1COO 0325/1728 <<< NEED HELP ON GROUNDING >>>
77266 B$ 1025 ALL @USBBS N2FAM 0325/1724 UNIX/LINUS/XWINDOW on an IBM cl

With thousands of active messages available on many systems, there are some handy shortcuts that can be used to locate messages of special interest (similar to having a word processing program list a specific group of files within a certain topic). For example, a search of all BBS messages containing the word "Space" in their subject field, which defines their topic, might look something like this:

Msg# TSLD Dim To @ BBS From Date/Time Title (LC-choice: *)
77287 B$L 3824 NEWS @AMSAT KD2BD 0325/1858 * SpaceNews 28-Mar-94 *
75054 B$L 6820 NEWS @AMSAT KD2BD 0318/1912 * SpaceNews 21-Mar-94 *
74498 B$ 2158 SAT @AMSAT I6CGE 0313/0256 AMSAT-NA SPACE SYMPOSIUM INFO
74280 B$ 1310 SPACE @ALLUS N8VLI 0312/1418 OHIO SPACE CONFERENCES
74042 B$L 6964 NEWS @AMSAT KD2BD 0311/1722 * SpaceNews 14-Mar-94 *
73810 B$ 1044 WANT @USBBS N1OHJ 0310/2159 Picture of MIR Space Sta

Messages are read by message number. To read message number 77266, for instance, the BBS user would type the command: r 77266

Some Important Terms

Digipeater—A digital repeater that receives and transmits on the *same* frequency, unlike a voice repeater that receives and transmits on different frequencies. The digipeater also stores the received data, retransmitting it when the frequency becomes clear.

Packet radio—A method of error-free data communications used by amateur radio operators. Packet radio allows several users to share the same frequency. It is, therefore, very "spectrum efficient."

TNC (Terminal Node Controller)—An enhanced modem and interface between the user's computer and transceiver, taking information from the computer, breaking it down into "packets."

The BBS would respond to this command by sending the contents of the message to the user, which might look something like this:

From: N2FAM
To: ALL@USBBS
Type/status: B$
Date/time: 25-Mar 17:24
BID (MID): 47078_WA2OLZ
Message #: 77266
Title: UNIX/LINUX/XWINDOW on an IBM clone?
Path: !N2NBN!K2ADJ!WA3NWL! WB3CE !WB3EUF!
N3FOA!AA3CH!N3GIR!WB3FQY!N3KDS!WB3FYL!
!N3DPU!N3IQD!WA2OLZ!

Is anyone running Unix, Coherent or Linux (or other Unix clone) and
X Windows on an IBM clone? I have a 386dx40 w/co and it's kinda tough
to come home to dos/windows after using X windows at work.

Dave,n2fam@wa2olz.nj.....skarbows@pogo.den.mmc.com

Support Your Local Digipeater

All TNCs support a digipeater function. A digipeater is a store-and-forward repeater facility that allows packet users to connect with distant stations. This connection is accomplished by using an intermediate station as a "go-between" or simplex repeater to make the distant packet connection.

A much more efficient way to connect to a distant station, however, is by going through a packet node. First, a ham would connect to a node, then instruct it to connect to the distant station. The actual process is transparent to users, but the end result is increased data throughput and connection reliability with distant stations. Some nodes allow real-time connections with remote stations half-way around the world.

How Does it Work?

Packet radio activity on the 2-meter band begins at 144.910 MHz and works up to 145.090 MHz in 20 kHz increments. Be aware, however, that some frequencies within this subband are reserved by regional agreement for digital communications other than packet. It's always good practice to monitor your local packet activity for a few days before actually trying to connect to a BBS. You can learn a lot by seeing how other people log into bulletin boards, check their mail, read bulletins, post bulletins, and put the local BBS through its paces. You should also check the packet radio section of the ARRL's *Repeater Directory* for detailed information.

In some areas, connecting to a DX "Packet Cluster" is possible. A Packet Cluster is a packet station that accepts multiple packet connections and offers information regarding DX activities taking place on the HF bands. If someone connected to a cluster hears a rare DX station on 40-meter CW, he can enter the DX information into the Packet Cluster so everyone connected will be alerted to the appearance of the DX station.

In addition to terrestrial packet radio activity, there is also a number of OSCAR satellites that carry packet radio transponders. The Japanese F0-2O (for Fuji-OSCAR-20) satellite, for example, operates in a manner similar to a terrestrial packet radio BBS. Like their earth-based counterparts, "Pacsats," as they're called, transmit beacons. But their beacons contain satellite telemetry information in addition to BBS status information. A typical transmission would look like the following:

8J1JBS>BEACON:
JAS1b RA 92/11/18 16:15:00
000 656 654 652 705 831 841 826 000 566
613 000 457 497 493 480 482 495 650 000
671 699 679 720 999 641 873 290 8FD 000
010 101 000 001 111 100 001 100 000 000

8J1JBS>BEACON:
JAS1b M0 92/11/18 16:15:00
Mailbox is at your service from 92/11/05 00:45:00
The JD Transmitter is available in all orbits
during JD mode.

The FO-20 satellite's mailbox contains messages similar to those found on terrestrial bulletin board systems, such as:

NO. DATE UTC FROM TO SUBJECT
0315 11/18 16:17 W9ODI AB4KN timing
0314 11/18 16:16 AB4KN KB2MVN Your picture
0313 11/18 15:50 JR7ZSZ JA7QHM HELLO
0312 11/17 10:15 DL6KG N0NBH finally..
0311 11/17 10:13 DL6KG W8BKO success
0309 11/17 04:15 N5AVK JH1AOY HELLO
0306 11/17 01:05 JH1AOY JA1VSB Hello Fufui san.
0305 11/17 01:03 JH1AOY ALL Hello
0304 11/17 00:58 JH1AOY KB2MVN OKAY, I wish so.
0302 11/16 22:43 F3ZD F6HLG 73 de TETEGHEM
0300 11/16 22:29 DL6KG N0NBH tnx
0298 11/16 20:50 F3ZD F6HLG
0297 11/16 18:52 OH2GV OHSTNS Onko kukaan qrv?
0295 11/16 17:26 W9ODI W1WXZ HELLO
0291 11/16 09:54 ON1AIG ALL ESDX Satellite DX News 16Nov92

0287 11/16 05:48 AB4KN ALL KITSAT Keps wrong
0286 11/16 05:48 W9ODI ALL KO23 EL. STILL BAD
0285 11/16 05:42 AB4KN ALL SPACENEWS, Nov. 16.
0284 11/16 03:49 AB4KN ALL ORBS$319.2L
0283 11/16 02:28 JA7MJ N8NYU N8NYU DE JA7MJ
0280 11/16 00:47 JH1AOY KB2MVN Hello Frank.
0279 11/15 22:18 G2BFO N8NYU HI
0271 11/15 11:32 IT9FUR IK8OZV prg. webersat
JAS>

Message 0305 from JH1AOY is typical of a packet radio "CQ" call via a BBS:

NO. DATE UTC FROM TO SUBJECT
0305 11/17 01:03 JH1AOY ALL Hello

Hello !

Nice to meet you.
My name is Masaji Tamagawa.
And address is 16 TSUKAHARA KIM
ITSU-CITY CHIBA 29211 JAPAN,
located about 50km south east of capital TOKYO, grid locator PM95XH.
I wish all the best.

73s...
Masaji...JH1AOY...

JAS>

Aboard the Russian MIR

The TNC in operation on the Russian Space Station Mir has a BBS mailbox feature called a "Personal Message System" that allows the Cosmonauts to exchange messages and greetings with ground stations. A typical listing of messages on the Mir PMS looks something like this:

Msg # Stat Date Time To From @ BBS Subject
42 P 91/03/09 04:37 U2MIR KA1SU Hello Musa
41 PR 91/03/09 03:21 ALL U2MIR qsl
40 PR 91/03/09 03:02 U2MIR VO1SA Greetings
39 PR 91/03/09 03:00 U2MIR VO1XC GREETINGS
38 PR 91/03/09 02:54 U2MIR KI4TD GREETINGS
37 PR 91/03/09 02:51 U2MIR KC4UZA hello agai
36 PR 91/03/09 01:31 U2MIR F3NW TOMORROW
35 PR 91/03/08 20:37 U2MIR TR8CA * SpaceNews 04-Mar-91 *
34 PR 91/03/08 20:36 U2MIR TR8CA PHOTOS
33 P 91/03/08 16:30 KJ9U U2MIR LIST 02.03.91
2538 Bytes free
Next message Number 43

A Message to Fellow Hams

When Cosmonaut Franz Viehboeck flew on the Mir space station in October 1991, he left the following message on the Mir packet station for all to read:

Stat : PR
Posted : 91/10/09 11:35
To : ALL
From : U5MIR
@ BBS :
BID :
Subject: FROM FRANZ

Hi folks!

I'm sending my best regards from the Soviet space station MIR. Today I finished my work and experiments here. I'm very happy that so far everything was very successful. I had lots of experiments to do, and without my friends here on board (Sergeij, Anatoli, Toktar and Sascha) probably I wouldn't be so successful. Thanks a lot to them. As a scientist I want to send a message to all my colleagues that space-research is a wonderful field, and a lab in space is just extra-ordinary. Anatoli, Toktar and I are going to leave the station at night and tomorrow morning we will have our landing. Thanks also to you and all the best!

Franz Viehboeck, Austrian Kosmonaut from MIR station.
9.Oct.1991,11.35

Over to You

In just over a decade, amateur packet radio has become an extremely popular method of "high-tech hamming." The low cost of TNCs, combined with the prevalence of personal computers, makes packet an attractive option in the hobby. Although packet radio is not for everyone, those interested in computers usually find it fascinating. It's also convenient for hams with odd work schedules, which can make traditional "hamming" difficult. These hams can take advantage of the store-and-forward nature of electronic mail, which enables them to check their mail at their convenience regardless of when it is sent to them.

But whatever the reason hams are drawn to packet, it remains a whole new world of amateur radio that is growing by leaps and bounds.

For More Information

The Packet Radio Operator's Manual by Buck Rogers, K4ABT. Published by CQ Communications, Inc., 76 North Broadway, Hicksville, NY 11801.

Getting Started in Packet Radio, video, also produced by CQ Communications.

Your Packet Companion by Steve Ford, WB8IMY. Published by the ARRL, 225 Main Street, Newington, CT 06111.

Your Gateway to Packet Radio by Stan Horzepa, WA1LOU, also published by the ARRL.

ARRL Operating Manual, also published by the ARRL.

ARRL Repeater Directory, also published by the ARRL.

Packet Radio With Your HTX-202 Or 404

Your HTX radio, a TNC, and a computer are all you need to get on packet radio.

By Allen Lorentson, N3DCX

If you've heard of packet radio, but haven't taken the plunge, you've probably assumed one or more of the following:

1. It's expensive
2. It's difficult to figure out
3. Nothing really interesting happens on packet

In my packet experiences, all three assumptions are wrong!

If you're like most hams, you already have two-thirds of your packet station: a computer of some kind (it doesn't have to be an IBM PC) and a 2-meter or 70-cm transceiver. All that's needed is one more piece of equipment, the TNC or packet modem.

For what it's worth, here's my story. I hope it will inspire you to think, "If he can do it, so can I...."

Ingredients Were All at Hand

I'd been intrigued by packet radio for many years, but two considerations held me back. Being the father of a young family, there always seemed to be higher financial priorities than my radio "toys" (for some reason, food, gas, and electric always win out!). And, while I'd mastered a basic knowledge of computers and radios, frankly the combination of both still had me confused. So, if I were going to get started, my packet setup had to be inexpensive and simple enough for me to work late evenings with a half-fried brain.

Luckily, my Radio Shack HTX-202 is an excellent radio for the job (as is the 404). It was designed with packet in mind. With its true FM transmission, it handles digital signals very well. Since my ultimate goal was to make a portable station for public service use, I chose to use my Tandy 1100FD notebook computer. It's fairly light, inexpensive, and has excellent battery life. All I needed now was a TNC.

The search began for a simple, inexpensive TNC. It wasn't an easy task. My friend Jack, N2RDS, had built a Ramsey packet modem kit for fun. Not really needing it, he sold me the completed and tested unit for $60—thanks old man! At last, I had all the pieces to the packet puzzle. Now all there was to do was hook it up and make it dance.

I had saved various articles on how to hook up the HTX-202 to a TNC, and Jack had given me the instructions to the

TNC, so I was able to make the connecting cable without much trouble. All the parts were available at my local Radio Shack store. These were some shielded audio cable (278-777), a 2.2 k resistor (271-1325), a 0.1 mf capacitor, a 3/32" mono plug (274-290), a 1/8" plug (274-286), and a 5-pin DIN plug (274-003). With a little soldering, the interconnect cable was ready. I was even able to fit the cap and resistor into the 5-pin DIN shell. All that remained was to hook the computer to the TNC (I only needed a simple serial cable) and to install a good antenna. For my station I chose a discone antenna from Radio Shack (20-013). (One word to the wise: At first I forgot to set up my serial port, and went nuts trying to figure out what was happening! Don't do the same.)

To run the device, the Ramsey TNC came with a software package called "Baycom." While there are much more powerful programs available, this one is capable enough for my needs. (The program's documentation is very complete, but was initially written in German, which makes for interesting reading!). *Now*, I was really ready!

Ready to Go

So it was hooked up, now what? I did what most hams do, and checked out the local bulletin boards. That part of packet was OK, but I could browse faster with a telephone modem.

Once again, Jack came to the rescue. From him I learned about these "links" that go around the world and allow you to have a QSO (talk) with just about anyone. Jack told me about his QSO with some folks in Moscow earlier that day. He told me what to type and away I went. A few minutes later I was talking with Hans from Rotterdam in the Netherlands, using just my keyboard and the little HTX-202! In my excitement, I forgot to log his call and subsequently cleared the machine, erasing all trace of my contact. But it was real, and it was great.

So far, I've only scratched the surface of what can be done with packet radio, but in time I'll be checking out more "packet racket." Meanwhile, I've been able to help a few other hams get started in packet by just covering the basics. After all, that's what ham radio is all about—sharing what you've learned to help others get a start, too. ■

Suggested Sources for TNCS

Advanced Electronic Applications, Inc., P.O. Box C2160, 2006 196th Street, S.W., Lynnwood, WA 98036 (206) 774-5554

Ramsey Electronics, Inc., 793 Canning Parkway, Victor, NY 14564 (716) 924-4560.

MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (800-647-1800).

Suggested Reading

CQ Amateur Radio, 76 North Broadway, Hicksville, NY 11801 (516-681-2922).

QST, American Radio Relay League, 225 Main Street, Newington, CT 06111 (203-666-1541)

Popular Communications Guide, 76 North Broadway, Hicksville, NY 11801 (516-681-2922).

Strictly Personal

Now families can enjoy communications with the range, clarity and increased privacy previously restricted to costly business-band transceivers!

Radio Shack's new PRS-100 is an affordable 2-way radio that operates on the General Mobile Radio Service band now reserved *exclusively* for personal and family use. It delivers crisp, noise-free UHF-FM sound, just like quality business radios. The result? Clear communications, minus annoying "breaker-breaker" chatter, in high-rises, malls, downtowns and places where other 2-ways fail.

The PRS-100 is also great for the great outdoors. Its powerful 1-watt output can span ranges up to several miles. You can stay in touch while hiking, camping, fishing or skiing . . . keep track of the kids . . . or chat with other licensed users.

Because the PRS-100 gives you benefits exclusive to the GMRS band, an FCC license is required. There's no test—just complete the included application and enclose a $35 fee. Practically everyone 18 or older qualifies. Best of all, a single renewable license covers everyone in your household for a full five years.

Sound interesting? Then get the details today at the store that offers the best in personal radio *and* personal service—your nearby Radio Shack.

We own the airwaves. Radio Shack

Those Helping Hams

Planning a road trip this summer? Don't forget your best road safety insurance—your radio.

By Gordon West, WB6NOA

Summertime is here and you're probably getting set for that upcoming vacation. Well, if you've passed your Novice or Technician class amateur radio test, why not bring along your radio. Using your ham radio on the road is a great way to find out about all the local scenic areas and hot spots—and that little radio can also get you out of some jams, too. Plenty of people, including me, have stories about the "Helping Hams" they've encountered all around the country.

Helping Ham, Gil Smith, W6FSF, helps monitor the maritime ham channels for emergency calls. (Photo by Gordon West.)

Which Radio to Bring

If you're a no-code Technician class operator or a Technician-plus holder, a 2-meter handheld or mobile transceiver is your best way to stay in touch on the road during your vacation. If you're a Novice class operator, the mobile 10-watt transceiver will give you plenty of local and distant contacts.

The 2-meter band for Technician class operators and above is your best choice for local information. There's always traveler's assistance, help with roadside emergencies, local tourist information, ham club information, advice on where to stay, and much more.

Be sure to preprogram your VHF 2-meter transceiver before you jump in that rental car or continue on into the next town down the road. Two-meter repeaters frequently use the following 10 common channels found in almost every city and town across the country:

146.94 minus 600 kHz TX offset
146.760 minus 600 kHz TX offset
146.880 minus 600 kHz TX offset
146.820 minus 600 kHz TX offset
147.000 usually a plus 600 kHz split
146.640 minus 600 kHz TX offset
146.700 minus 600 kHz TX offset
147.300 plus 600 kHz TX offset
147.360 plus 600 kHz TX offset
146.790 minus 600 kHz TX offset
146.520 national simplex (no split) calling frequency

When you're in a new city while on vacation, scan these channels for activity. As soon as you hear two stations talking over a repeater, wait until they finish, and then give your own call sign and say, "Visitor for information." You'll have more responses to your call than you can handle!

Another way to locate a nearby repeater is to give your call on an open channel and listen for the repeater to answer your transmission and self-identify in code. If the repeater comes in strong, you should have no problem finding another ham.

Radio Always Lends a Ham

On one snowy trip to New York I had a flat tire. I came up on the Metroplex 2-meter repeater, and one of the nearby club members drove out with a pneumatic jack to help me. If you're planning on going to New York, you can contact Metroplex Amateur Communication Association ahead of time for local repeater information (phone 201-592-7614). The same, of course, goes for other areas of the country.

Help Enroute to Disneyland

"While riding my motorcycle to Disneyland in California, I threw a chain and thought I was totally out of luck," com-

ments "Doc" Palmer, N6OSN. "I got on my 2-meter handheld, a Radio Shack HTX-202, and received immediate help from the Motorcycling Amateur Radio Club president, Ray Davis, KD6FHN. He knew what I needed, and got me set within an hour," added Palmer.

Earthwinds Problems

Recently, when project Earthwinds' around-the-world balloon attempt ran into major problems with a frozen valve at 36,000 feet, Captain Larry Newman, KB6JGM, had no trouble talking to several mobile stations on national simplex frequency 146.520 MHz. He asked about the condition of the nearby bean field they were going to set down on. "I heard as many as 15 different mobile units come back to me on 146.520 simplex," added Newman.

Help for Newcomers and Visitors

Hams go all out for newcomers, visitors, and fellow amateur operators in a jam. With helping hams usually running powerful mobile units or a base station set-up with a high-gain antenna, *you* don't need much. A simple magnetic 2-meter outside antenna hooked into a handheld 2-meter transceiver (running on its own battery pack or plugged into a cigarette lighter receptacle) will do the trick. When I got

Learning how to enter repeater frequencies into memory is easy with the HTX-202 handheld.

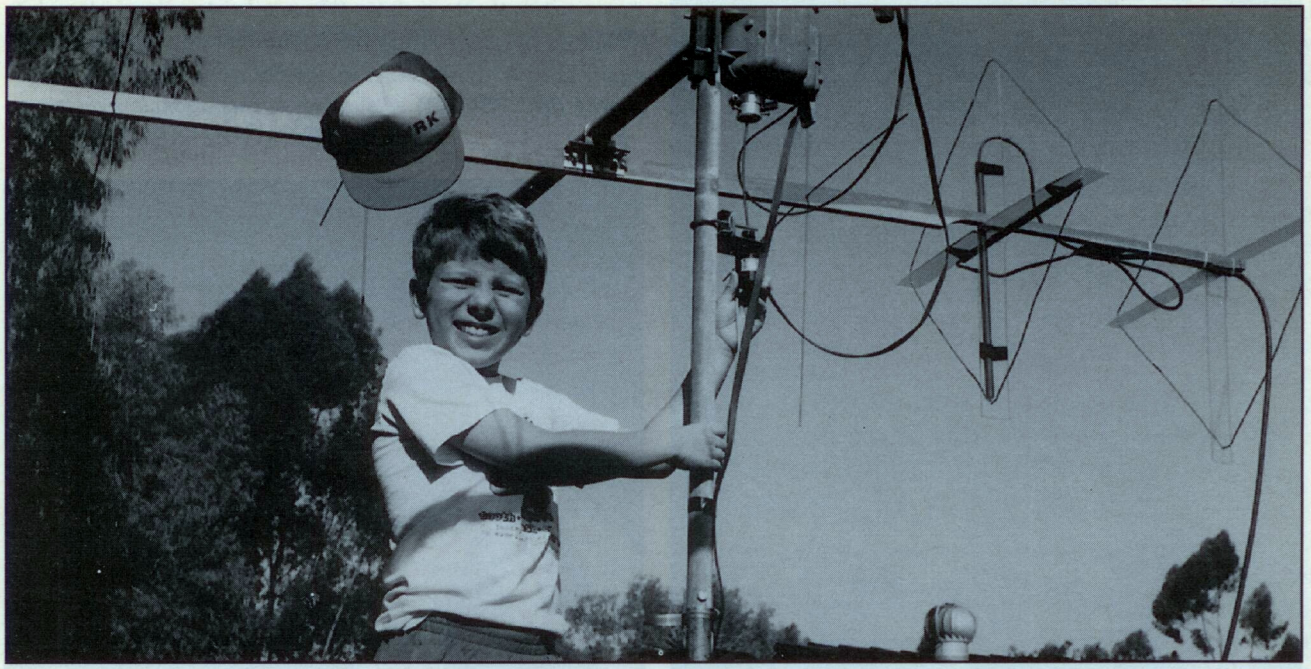
Martha Beld, KB6OZN, sets up her 2-meter radio in a rental car. (Photo by Gordon West.)

bogged down in a snow bank in Annapolis, Maryland, last February, I ran 1 watt from my HTX-202 handheld, which was plenty to trigger the distant repeater. In no time I was getting a push off the icy bank of the road—you guessed it—by a local ham who came to the rescue.

Now that certain types of business calls are permissible on ham radio, you can use your 2-meter rig to locate hotel accommodations, make dinner reservations ahead of time, or order repair parts or accessories directly from a dealer. Many local repeater associations will offer you the use of their phone patch when you're visiting in town.

The Novice operator will find the 10-meter band is the best bet for local help while traveling across the country. Right in the middle of your voice privileges, 28.400 MHz is the frequency of choice. You can also usually find the popular Radio Shack 10-meter SSB rigs available at local ham swap meets or over ham radio packet bulletin boards. And, if you do place a call for assistance on 28.400 MHz, be sure to ask for *local* assistance. There are many days when signals skip for thousands of miles—but when you need help, you want it local! In fact, even though I carry all sorts of worldwide radio gear in my rental car when I'm traveling, I'll always choose 2-meters or 10-meters for local assistance, simply because that's where the "locals"hang out.

So why not plan to take along your radio equipment this summer as you vacation around the country. If you're not yet licensed, consider bringing a scanner. This way you can eavesdrop on all the information out there, including the transmissions of those traveling hams who bring their radio equipment for fun, convenience, and safety. ■



You can work satellites and the space shuttle with home-built antennas. Pictured here is KD6WRK. (Photo by Ron Earl.)

Ham Radio Happenings

The latest word on developments affecting the Amateur Radio community.

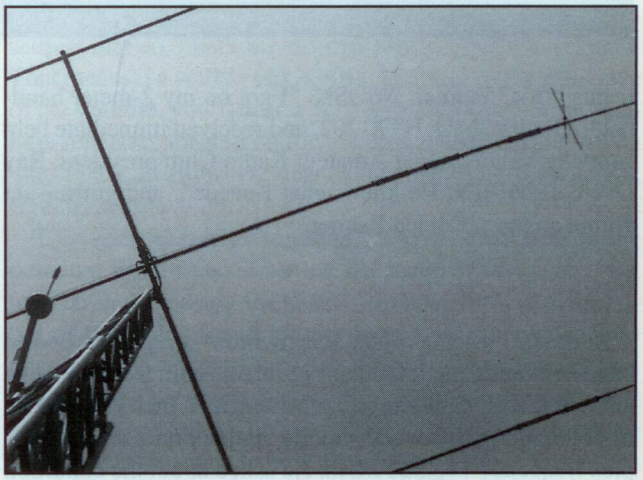
By Gordon West, WB6NOA

There's always some excitement going on in the Amateur Radio world. This summer, some of the news is coming straight from the top.

The Federal Communications' Gettysburg licensing facility has a new computer. They are just coming up to speed with the new system, which will have some new terrific benefits to the amateur radio service.

The FCC's new computer will now keep track of all six license categories, Novice through Extra. You thought there were only five—Novice, Technician, General, Advanced, and Extra? Well, you forgot the Technician-plus, which is Technician "plus" the code. Up until now, the Technician-plus database was maintained at the volunteer examiner coordinator level only, but now the Commission can keep track of all classes of amateur radio licensing, and they can now tell the difference between Technician no-code operators, and Technician-plus operators who have learned the code at 5 wpm (words per minute).

The new FCC computer will allow electronic processing of the new amateur radio Form 610. "Instead of waiting eight to 10 weeks for a new license, applicants might see their new call letters in their mailbox within a couple of weeks," commented Gordon Girton, W6NLG, Sunnyvale VEC (phone 408-255-9000 for recorded information). "I have been working closely with the Commission to help modernize and speed up the licensing process," added Girton. So next time you take a new test or upgrade, you can expect the paperwork to come back from the FCC's Gettysburg licensing facility a lot faster.



A simple high-frequency beam will put out the strongest signal on the 10-meter band.

Vanity Call Signs

The new computer will also allow for vanity call signs. If you are a licensed amateur radio operator, you'll be able to select a specific unused call sign, perhaps using your initials, or maybe the call letters that your mom or dad once held. The fee will be approximately $70 for a 10-year vanity call

With only 25 watts on 10-meters, this operator worked 40 states in one week! (Photo by Gordon West.)

sign, but it's sure to make a lot of hams, who accidentally let their old call signs lapse, very happy. Everyone will get a chance at getting a special call sign, but the first opportunity will go the Extra class operators, and then on down the amateur radio licensing ladder.

Exam Revision

As of July 1, 1994, the written Element 3B examination for General class licenses will be revised. Only the General class tests will be affected, and the changes are minimal. If you've been studying the older Radio Shack General class book for an upcoming 25-question written exam, you should do just fine. When you compare the old questions to the new ones, you'll see that the biggest change is simply in how the questions are worded.

Radio's Growing Numbers

This summer marks the greatest number of amateur radio operators in the history of our service. Thanks to the entry-level Novice and no-code Technician licenses, our ranks continue to grow by about 10 percent a year.

The current numbers break down like this:

10% are Extra class (65,300)
18% are Advanced class (112, 700)
20% are General class (126,900)
36% are Technician class (227,700)
16% are Novice class (99,400)
TOTAL: Fast approaching 3/4 million operators!

Sporadic-E Openings

Technician class privileges are full of amateur radio worldwide excitement this summer if you've passed the 5 wpm code test. Technician-plus operators will work some long-range sporadic-E skywave openings on the 10-meter band. Ten meter ionospheric skip is a regular occurrence during the summer months, when periods of intense ionization reflect radio waves back to earth, making long distance contacts possible. Sporadic-E contacts of up to 1,500 and even 3,000 miles always occur from May through September, regardless of the sunspot cycle! Even though we're sliding down the back side of our present 11-year solar cycle (and declining sunspots make some contacts more difficult), summertime sporadic-E will always help Technician-plus operators work those distant challenges.

Space Shuttle Contacts

Technician no-code operators are getting *very* excited about regular contacts with the space shuttle. It's easy to work the shuttle on both voice and packet, and the no-code Technician class operator has full operating privileges on all of the VHF and UHF bands. And when the next phase of our amateur satellite program is launched in another couple of years, it will be commonplace for handheld SSB (single-sideband) communications to travel thousands of miles to other operators throughout the world.

Six-Meter Contacts

Summertime also brings the excitement of 6-meter skywave band openings for Technician no-code operators. Most 6-meter activity is SSB and CW (Morse code) and takes place around 50.150 MHz. "I run a Radio Shack Pro-2004 scanner, and can quickly tell when the band is ready to open on 6-meters because of increased low-band 30 to 50 MHz skywave reception," commented Dave Metz, KZ1I. "My ham shack revolves around my programmable scanner tipping me off to the excitement on summertime band openings," added Metz.

Tropospheric Ducting

Summertime always brings the excitement of tropospheric ducting contacts from portable and mobile 2-meter equipment. This type of signal propagation occurs when a stable high pressure system squeezes an air boundary about 1,000 feet up, funneling and refracting 2-meter radio waves over hundreds of miles. "Here at the Johnson Space Center, we have talked through repeaters over 800 miles away for several hours," commented Terry Pierce, KC5CSW, of the Johnson Space Center (JSC) Amateur Radio Club. "And many operators were using small handheld 2-meter transceivers. They couldn't believe their ears when we came over their local repeater," added Pierce. The NASA JSC operates club station W5RRR, and they've found that one of their favorite antennas for monitoring VHF and UHF band conditions is the Radio Shack Discone. "The all-frequency capabilities of the discone give us great signal reception in all directions," said one of the new astronauts visiting the W5RRR station.

The space center has also discovered just how much interest there is in amateur radio "Ham radio is one of our most popular classes," added Matt Bordelon, KC5BTL of NASA "They all want that ticket."

Just remember, there's plenty of summer excitement on amateur radio. Even if you're not a ham, you can tune to 145 to 148 MHz with your scanner for repeater action. And if you have a shortwave receiver, listen in at 28.400 MHz USB (upper-sideband) to see why ham radio is so much fun. ■

Devastation hits the Midwest during the floods of '93. Pictured is Keith Mehl, a member of the Greater Des Moines REACT Team #4872. (Photo courtesy REACT.)

Members of the San Antonio REACT Team #3622 and the American Red Cross gathered in appreciation of the $2,500 product donation K40 Electronics provided. Pictured, left to right, are Lee W. Besing, Chairman of the Board Team #3622; Sharon Earley, Disaster Chairman for the American Red Cross and member of REACT; George Snell, Director of Disaster Services for the San Antonio American Red Cross; and Randy Weddle, Chief Executive Officer for the San Antonio American Red Cross. (Photo courtesy REACT)

Lifesaving Radio

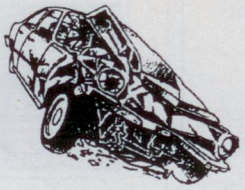
There's much more to CB radio than "Smokey Reports" and hobby talk.

By Fred J. Lanshe

The snow was swirling around the car, periodically reducing visibility to a momentary white-out. As he groped his way through the storm and bitter cold of a Chicago winter, Henry "Pete" B. Kreer was having difficulty seeing the edges of the highway.

Suddenly, through a break in the obscuring whiteness, he saw a flash of red off to the right, then could discern a car stalled in a snowdrift, emergency blinkers flashing, hood up and a young woman standing alongside, waving her arms frantically. Without a further thought, Pete pulled his car over

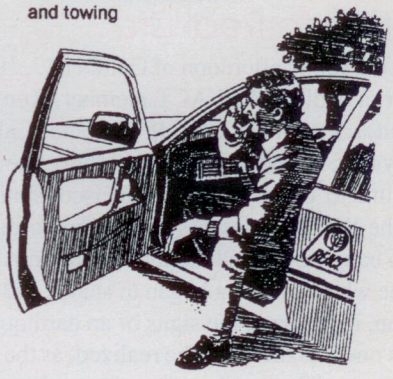
When seconds count...



REACT is there

In emergencies, reliable communications are the lifeline for survival.

There 's an accident on I-80, at mile marker 79, west bound. We need an ambulance and towing



REACT is a public service organization comprised of private radio operators serving travelers and their communities alike with radio communications.

Purposes include: the correct usage of CB Emergency Channel 9 . Developing the skilled use of the CB Radio Service, G.M.R.S. (UHF), Amateur with packet, BBS, Cellular and other radio services as additional sources of communications in emergencies.

I'll notify the proper authorities.

REACT coordinates efforts with other emergency organizations including: Police, FEMA, NOAA, RACES, ARES, NOVAD, the Salvation Army and the American Red Cross.

Today's *REACT* Teams provides Safety Radio assistance for community events such as parades, runs, walk-a-thons, bike tours, boat races and even hot air balloon festivals. ***REACT* Teams** host **" Safety Wake Breaks ",** on holiday weekends, along the highways.

For an exciting challenge in community service,

CONTACT:

REACT International, Inc.

Dept. P
P.O. Box 998
Wichita, KS 67201
Phone: 316-263-2100
FAX: 316-263-2118

REACT members maintain a vigilant watch over CB Channel 9.

to the shoulder, rolled his window down, and yelling over the howl of the wind, asked if he could help.

"I have a very sick child in the car and we're stuck," the woman yelled back. "Can you please help?"

Pete got out, squinting against the blowing snow, and peered inside the stuck car. Inside, the baby was crying, and the woman now had an expression of alarm and despair on her young face.

"I'll get help here right away," said the samaritan, dashing through the blowing snow back to his car. Under the dashboard Pete recently installed a new piece of electronic equipment, a miniature transmitter and receiver, licensed at the time under a new classification called Citizen's Band Radio (CB).

He picked up the microphone and selected a channel he thought would most likely have someone listening, then called for emergency help. Within minutes, a state police car was on the scene and the mother and sick baby were taken to a nearby hospital.

That was the winter of 1961, and it marked the beginning of what was to become an international organization of radio

operators. This organization, called REACT (for Radio Emergency Associated Communications Teams) is dedicated to helping people in emergencies.

REACTing to Real Life

Late on the sunny afternoon of October 17, 1989, nearly 30 years later, a dedicated REACT member, Ken Cochran was working in a warehouse outside Oakland, California. He'd had a busy day, but now all he could think about was getting home in time to watch the San Francisco Giants in the third game of the World Series. As he was preparing to close up, he heard a banging on the loading dock door. As he moved to open it, the whole building began to shake, and Ken, a native Californian, recognized the signs of an earthquake.

But this one was different, he realized, as the rumbling and creaking intensified, and crates of merchandise began to crash to the floor. He headed for the office to ensure his coworkers were safe, and went to shut off the main gas valve. As he did, he heard a report that the nearby expressway had collapsed. He jumped into his truck and turned on his CB. As he headed for Cypress Expressway, he learned that the Bay area had been badly hit, but emergency communications were being established by other REACT teams. Arriving at the expressway only three blocks from work, he was shocked to find the multi-level elevated highway had indeed collapsed, crushing cars and their occupants under huge chunks of concrete.

He spent hours on the scene, lending whatever assistance he could to fire and emergency rescue teams who were extricating the victims.

Not far away, Mervin Lee, a REACT team leader, was hauling his radio equipment from his house—where the power had gone out—to his truck, where he could get the radios working from the battery. Meanwhile, a neighbor was rounding up a portable power plant as other friends began checking to see how they could help one another get on the air to help with emergency communications.

Within 20 minutes after the tremors struck, four REACT teams had established an emergency communications network, interfacing with fire, police, paramedic, emergency and other disaster relief crews.

Last year, from mid-July through August, REACT teams were busy during the Great Flood of '93. The call came to Keith Mehl's radio that the levy had broken near the Des Moines Water Works plant, which treats all the water for Des Moines and the surrounding suburban communities. Keith called Ray Tucker and Bob Hearn, the team president and vice president. Their radios came to life as other team members began broadcasting this information on all channels (not just CB channel 9, the official emergency channel). They informed people to start boiling water in anything they could. Meanwhile, other REACT teams in the perimeter areas of the flooded region were giving road directions and telling which roads and bridges to avoid because of swiftly rising water.

One of those dreary days around dawn, Ray's scanner stopped on the Des Moines police dispatch frequency. The report said they would be losing power and communications

Emergency?

Broadcast key details over and over (WHO • WHERE exactly • WHAT) without regard for a reply

REACT International, Inc., P.O. Box 998, Wichita, KS 67201 (316)263-2100

Contact REACT about joining their worthwhile organization.

in about 10 minutes because of the rising flood water downtown. The team leader contacted the police station, informing authorities that Greater Des Moines REACT #4872 members would be standing by on CB channel 9 to help with any needed communications. They relayed numerous car-to-car communications while the power was out.

REACT team members from several states in the flooded region worked various duties, including staffing at local Offices of Emergency Management, operating telephones, manning mass feeding stations and water distribution centers, and filling sand bags.

Members of REACT licensed with different radio services filled in as additional radio operators at the American Red Cross and Salvation Army, interfacing with multiple agencies and the military. With hundreds of volunteers, the National Guard and REACT worked hand-in-hand erecting a sandbag levee six feet high and a half mile long.

After numerous storm updates, the National Weather Service broadcast announcements warning residents to stay out of the flooded region because so many roads were lost. This information was also made available over both CB channels 9 and 19 throughout the entire emergency.

The next day while at his radio, Ray, still routing traffic, learned of an appeal for medical supplies for people building a levee. Ray contacted Tom Grayson, District Manager of the Walgreen Stores; that resulted in Grayson's donating three cases of medical supplies. Ray promptly delivered them to the sandbag site.

Such scenes were repeated countless times in the multistate region. REACT members continued working their radios and assisting until the flood waters receded and the state of emergency was lifted.

Radio's Early Days

Ever since the sinking of the cruise ship Morrow Castle off the coast of New Jersey in 1921, radio communications have played a vital role in emergency communications. Back then, a young amateur wireless operator named David Sarnoff picked up and relayed the SOS from the stricken vessel, (Sarnoff, incidentally, went on to become founder and president of the Radio Corporation of America).

With advancements in radio technology, the amateur radio "ham" operator continued over the national decades to be an important link in disaster relief and other emergencies. However, in the past 30 years, a new technology and new type of radio operator moved to the forefront of emergency and disaster communications.

It Began As A Hobby

CB radio began in 1959. It briefly turned into a trendy fad, and more recently matured into an extremely useful tool. Today, ordinary people, without great technical knowledge or an understanding of the complexities of International Morse code, can communicate with one another over moderately long distances.

It wasn't long after CBs hit the market before someone realized its potential for emergency communications. Long-haul truckers were among the first. They quickly established an informal network on the major highways to inform one another of dangerous road or weather conditions, speed traps or accidents. Soon vacationers and people with RVs on the interstates picked up on the advantages of having a CB radio on board. It was inevitable that an organization such as REACT would evolve.

Whether it's a marine emergency, fire, hurricane or tornado, airplane crash, automobile accident, lost child or suspected drunk driver, members of this world-wide group, who call themselves REACTers, are there to lend assistance both to the people involved and to the official agencies charged with responding to these incidents.

Trained Professionals

Many REACTers are also trained professionals—police officers, paramedics, firefighters, ambulance personnel, who, when not on official duty, monitor their CB radios at home or in their vehicles. Others are radio buffs who devote a portion of their air time to monitoring, but the vast majority are folks from all walks of life with an interest in radio and a desire to simply "help out." Some are business people, Boy Scouts of America, homemakers, teachers, office personnel, government employees, and a broad cross section of professionals. They have in common a devotion to their neighbors and a willingness to go the distance when help is needed. Several have even died in the course of performing voluntary duties.

Tailored Emergency Support

From a modest beginning in January 1962, REACT has grown far beyond a mere local help network. While its members' primary activity remains the monitoring of CB channel 9 for the motoring public, today's REACT teams tailor their safety support service toward their communities' needs, along with promoting highway safety. Many teams host "Highway Safety Coffee Breaks" along major highways to help combat driving fatigue.

REACT International, Inc., a not-for-profit organization with headquarters in Wichita, Kansas, coordinates fund-raising and membership drives and handles publicity for the organization. An annual convention sets policies for the organization, including electing a board of directors. The organization also supplies incentive prizes for outstanding contributions by REACT teams and individuals and offers special CB equipment insurance.

The Figures Tell The Story

To give you an idea of the scope of REACT activities, in 1992, 136 teams reported a total of nearly 775,000 hours of monitoring with nearly 56,000 calls taken. These broke down into more than 13,000 motor vehicle accidents, 14,000 disabled vehicle reports, and thousands of other incidents. That same year, REACT members handled more than 6,000 requests for road information and responded to 558 medical emergency calls. An additional 7,000 calls and nearly 53,000 monitoring hours are listed under the classification of "other."

REACTers also volunteer large amounts of time to fund-raising for theirs and other charitable groups, especially in the healthcare field. Often they provide radio assistance and safety support services for community events such as charity walk-a-thons, runs, bike tours, boat races, air shows and even hot air balloon festivals. Many members study emergency first aid and are CPR-qualified to increase their effectiveness in an emergency.

With the trend toward cuts in municipal and other budgets, fewer personnel in fire departments, hospitals and police agencies can be spared for emergency channel monitoring. As a consequence, REACT members are finding more and more often that they are the sole link between an individual and emergency services and are accepting their increased role and responsibility as lifesavers.

After all, it was CB operators, the people who formed REACT, who originated the idea of creating this link between the citizen and the emergency services. It was they who called for and then publicized the correct use of these radios to help people in all kinds of emergencies.

Their numbers are growing and so is their dedication of service to their neighbors and entire community. If you're interested in becoming an integral part of your community, contact REACT International, Inc., Dept. RS, P. O. Box 998, Wichita, KS67201 or call 316-263-2100.

The glossy newsletter, The REACTer, with an international circulation of about 10,000, keeps members informed of activities and technological changes in radio communications, provides tips for effective monitoring of the emergency channel, and covers special events conducted by member teams. Informative newsletters are also published by individual teams and councils.

New REACT teams are being chartered every month, with their activities covered in The REACTer, along with reports on outstanding contributions to emergency assistance provided by members.

Recently compiled and published for the first time, the REACT Team Contact Directory lists 528 member teams in 50 states and 20 in Puerto Rico, as well as 19 teams across Canada, from Nova Scotia to British Columbia. There are 14 teams in the United Kingdom, including the Channel Islands, one in Trinidad/Tobago, one in Germany and three in Sweden. In all, 10,000 men and women worldwide are regular, affiliate (not a team), or life members of REACT. ■

In Review: The TRC-493 CB Radio

By Walter G. Green III

Let's cut right to the good stuff—how well does this mobile CB rig work? The answer is, "excellently." If you're looking for a state-of-the-art, reasonably-priced AM Citizen's Band radio, this could very well be the one!

The TRC-493 (Radio Shack Catalog #21-1590) has all the features we've come to expect as standard. It's a 40-channel transceiver (transmitter and receiver in one radio) that has a digital signal processor (DSP) to reduce signal noise and static, single indicators for modulation and DSP, plus a four-indicator bar for transmit power and signal strength. Knob controls let you adjust volume, squelch, tone, and RF gain. It can be used as a public address system in your vehicle (mounting hardware is included), and an external speaker can also be connected if you need one.

The Radio Shack TRC-493 CB Transceiver

Even the unit's appearance is modern and attractive; you don't have to be ashamed to be seen bringing this one home.

The Controls

I particularly like the squelch control. Some radios have a lot of play in the squelch as you rotate the control until the background noise goes away, then turn it back for best sensitivity. But the TRC-493 is almost "right on" when you first squelch out the noise. This makes it much easier to use as a mobile—there's less fiddling with controls, which allows you to pay more attention to your driving!

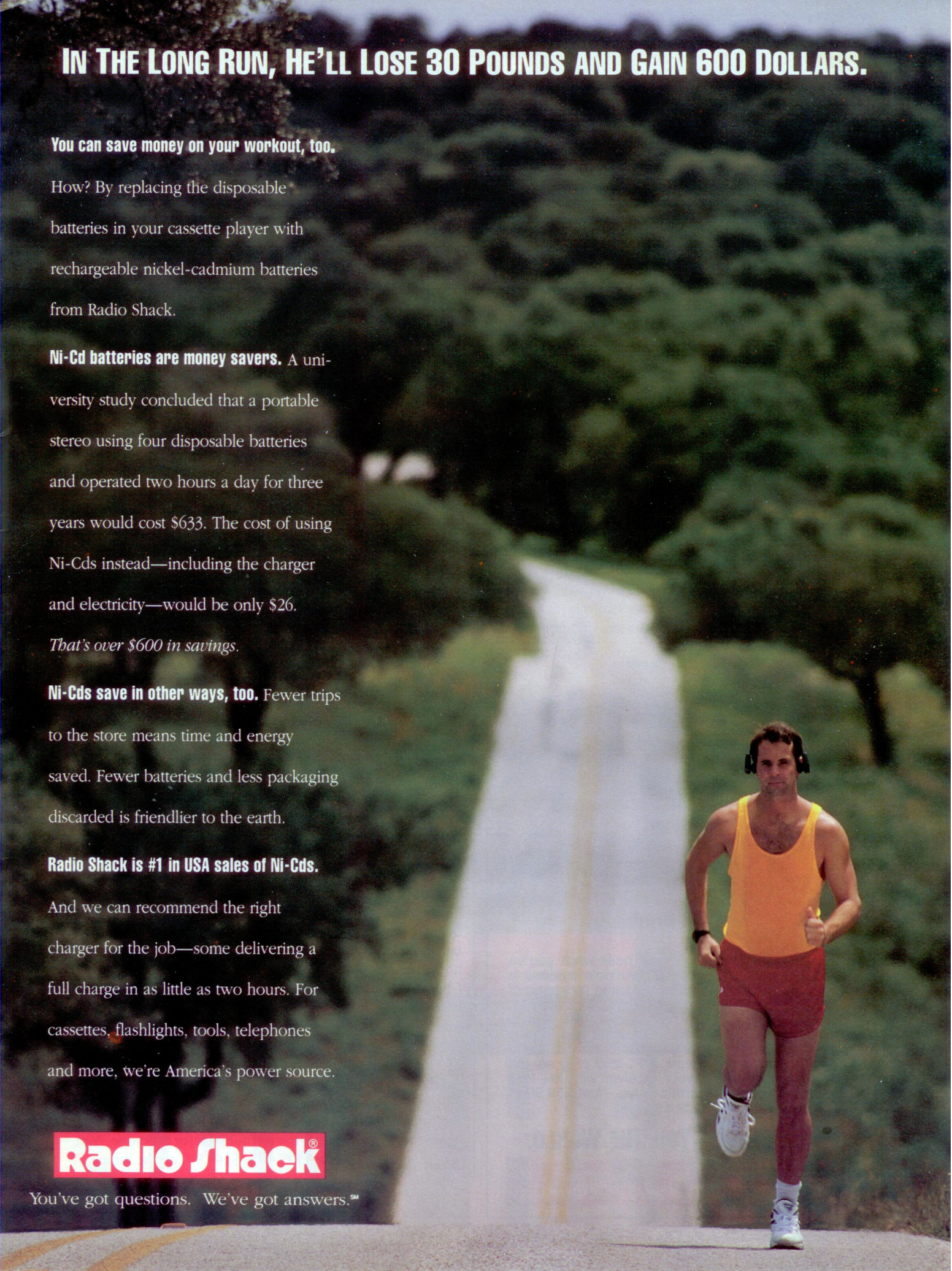
The channel selector has a good feel when you change channels. Some CBs change channels so easily, you aren't sure where you are unless you watch the display. With the TRC-493, however, you *know* that the channel has changed.

Digital Signal Processing

How does DSP work? In this radio, DSP is combined with a built-in automatic noise limiter. This helps reduce the roar of background noise that sometimes makes using CB a painful experience. At the busiest time of day, using a good antenna, you still have to set the squelch high. As conditions clear up at night, however, the DSP strengthens the weaker signals and definitely gets rid of background hash. The manual also says it gets rid of whines and whistles commonly heard on crowded channels. It does—not all of the noise, but enough to sit up and notice the difference. The TRC-493 sounded a lot cleaner than a base station comparison unit tuned to Channel 19 for several hours one afternoon. And, unlike on some radios, I never had any trouble finding the DSP control. It's the only push-button on the lower part of the panel, and a light above the row of signal/transmit power lights reassures you it's turned on.

The Radio Itself

The first four control knobs are well-designed. The two you will use most, the volume and squelch, are side-by-side (believe it or not, there have been radios that hide the squelch as the third or fourth knob, making adjusting it at night interesting, to say the least). The RF gain is the last knob on the right, again easy to find if you want to adjust received signal strength. I gave the panel the blindfold test and had no


IN THE LONG RUN, HE'LL LOSE 30 POUNDS AND GAIN 600 DOLLARS.
You can save money on your workout, too.
How? By replacing the disposable batteries in your cassette player with rechargeable nickel-cadmium batteries from Radio Shack.
Ni-Cd batteries are money savers. A university study concluded that a portable stereo using four disposable batteries and operated two hours a day for three years would cost $633. The cost of using Ni-Cds instead—including the charger and electricity—would be only $26.
That's over $600 in savings.
Ni-Cds save in other ways, too. Fewer trips to the store means time and energy saved. Fewer batteries and less packaging discarded is friendlier to the earth.
Radio Shack is #1 in USA sales of Ni-Cds.
And we can recommend the right charger for the job—some delivering a full charge in as little as two hours. For cassettes, flashlights, tools, telephones and more, we're America's power source.
Radio Shack®
You've got questions. We've got answers.℠

trouble finding the right knob each time, just by feeling the front of the radio.

All mobile radios, however, are a compromise on size. They must be large enough to make controls easy to use, yet small enough to fit in the car. The TRC-493's two slide switches are so small as to be difficult to use unless you're stopped somewhere and can concentrate on what you're doing. This is not a big deal when using the CB/PA switch, but you're probably safer using the channel selector knob to get to Channel 9, rather than using the OUT/CH 9 switch.

Getting Ready to Operate

There are a couple of things you should think about before you start to use the TRC-493. First, when installing the unit, you'll notice the radio has its speaker on the bottom, which is ideal for the standard under-dash or overhead mounting situation. If you're going to put it anywhere else, though, think about where the speaker is pointing, or you may muffle some of your audio output or get some distortion.

Second, make sure the microphone is attached when you turn on the unit, otherwise there'll be nothing but silence. You *must* have the microphone installed in order for the speaker to operate. If you're used to a model that doesn't require a microphone to receive audio, it can surprise you.

The TRC-493 as a Base?

Can you use TRC-493 as a base with a regulated power supply, such as the Radio Shack 22-120 unit? Yes, but it isn't quite as good as regular base radios like the Radio Shack Navaho, for instance. Using a cut-to-length dipole antenna (normally an excellent performer), my reception was nearly as good as with my prime base station, a top-of-the-line Cobra 2000 GTL. The transmit output, however, was not as good as the Cobra's or Navaho's. While on a quiet night this is probably not a big problem, in the daytime it makes effective communication difficult.

The Manual

This manual is even better than Radio Shack's normally very good manuals. It's clear, simple, and easy to read without a lot of technical jargon. On Page 2, you'll find a list of all the features and an explanation of their function, all in plain English. For example, the Modulation Indicator is explained using words like "talking too loudly or too softly when you are transmitting," as opposed to the often-heard, "overmodulating."

This manual has a lot of good information in it and is well worth reading. Furthermore, each control is illustrated and its use explained step-by-step as part of the overall process of communicating. This is a major plus—you don't have to move back and forth to a diagram at the front of the manual trying to identify which button they're talking about. The step-by-step approach leads you through the TRC-493's operation as well as explains individual controls, and it's one of the best explanations of operating controls I have seen in any radio manual.

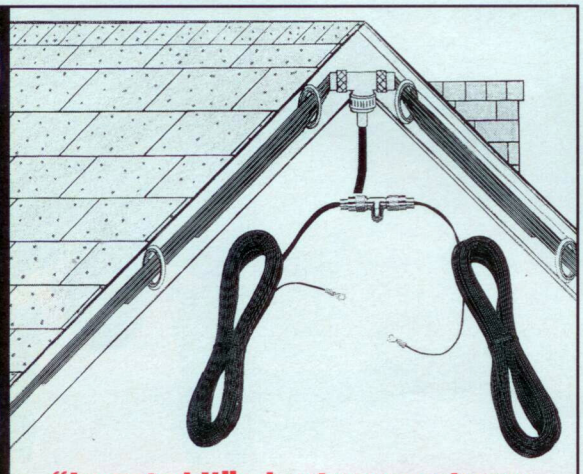
The problem-solving checklist on Page 20 is also excellent. For each of the six possible problems, a logical series of things to check is given, starting with the most common cause of the problem. Again, this has been well thought out and is easy to follow.

Another thing I liked about the manual was its explanation of different types of antennas under "Choosing an Antenna." In simple, clear language, the novice radio owner is given good reasons to consider each different antenna type, as well as helpful hints for installation. In another section, CB 10-Codes are mentioned and a short list is provided, although it's not the APCO standard list. (The Associated Public Safety Communications Office's 10-Codes are the only real national standard; but if you want to learn and use 10-Codes they're a good starting point.)

One other comment on the manual bears mentioning. The manual section on "Observing CB Courtesy" says Channel 9 is exclusively for emergencies. Certainly emergencies always have priority and the channel should be cleared for them, however, Channel 9 is also intended for motorist assistance, including such things as giving directions and other non-emergency assistance. The manual goes on to say that Channel 19 is most often used by travelers to find out about road conditions, local information, etc. While this may be true in many cases, it's also important to note that if a local public safety communications group is covering Channel 9, this information is also available on Channel 9.

One final point...the TRC-493 also comes with a set of the CB rules. Please read these! CB does have rules which have the force of both federal law and common sense. If people abide by them, operating is a lot more fun for everyone. And, you'll enjoy your new TRC-493 ($149.99) all the more. ■

OUTDOORS



"Inverted V" shortwave antenna

World-band DXers—now hear what you've been missing! This multiple-dipole antenna is design-optimized for outstanding reception of all shortwave broadcast bands. No matching, no power source required—it's equivalent to over 190 feet of wire, yet just 65 feet in total length. Mounts easily on roof eaves or a single mast, and accepts a PL-259 plug so you can connect it to your receiver with low-loss coaxial cable. A terrific value—just $39.99 at your nearby Radio Shack.

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A Look At CB Antennas

For the Citizen's Band radio user, there's a wide variety of antennas available, all of which cater to individual needs.

By Chuck Gysi, N2DUP

The type of antenna you use on your CB radio depends on whether you intend to operate from your home, car, or even a walkie-talkie. You wouldn't use a mobile CB antenna to operate from your home and you certainly couldn't mount a 16-foot base antenna on the rear bumper of your car.

When you operate your CB radio from home, it's referred to as a "base station," while a radio operated from a vehicle is known as a "mobile."

Base station antennas are designed to be mounted on a mast, which is a lightweight pipe. This mast can be installed either from the ground up and attached with an eaves mount to the rear of your home, or mounted and guyed on a rooftop mount.

Base station CB antennas should not be mounted on the same mast as your TV antenna for two reasons. First, the weight of a large CB base antenna may be too much for both the TV antenna mast and rotor to handle. Secondly, the CB antenna would be very close to your TV antenna and most likely will cause reception problems for those watching TV in your home while you chatter on the airwaves.

For the most part, base antennas work the same. The trick is to use a good coaxial cable with your base antenna. For instance, if you need 50 feet or more to run from your CB radio to the antenna, you use RG8U cable. The RG8U cable is fatter than RG58U coaxial cable, but it offers less signal loss while you transmit. If you're using less than 50 feet of cable between your radio and antenna, RG58U will prove satisfactory. Because the RG58U cable is thinner, it also is easier to manipulate through walls and around bends.

Mobile CB Antennas

Mobile CB antennas come in a variety of types, sizes, and shapes. The reason mobile antennas aren't as large as base station antennas is that they usually have a coil at the base or middle of the antenna. The coil, which is wound wire inside a plastic-enclosed housing, essentially makes the mobile antenna electrically as long as the base antenna.

If you plan to use your CB radio in your car, truck or van, you can drill a hole in the roof of the vehicle and mount a permanent antenna. This works best because you can get a good electrical ground for the antenna, especially if you scrape the paint from underneath the car's surface (where the antenna mount touches the car's metal).

But, not too many people want to drill a hole in the roof of their new car, especially if they're planning to resell it in the future. The most popular choice for mobile CB operation, then, is to go with the magnetic mount antenna. This type usually has a coil at the bottom of the antenna and a magnet on the bottom of the antenna's base which allows it to be placed anywhere on the car. The magnetic mount CB antenna can be easily removed before going through the car wash, or it can be stashed inside the car or trunk while parked so as not to draw thieves' attention.

The magnetic mount CB antenna can be placed anywhere on the vehicle, but the best place is in the middle of the roof. This will offer the best reception and transmission capabilities. If you stick the antenna on the trunk lid, the antenna is going to favor sending and receiving in the opposite direction (toward the front of the car). While that may be best if you want to direct your signal in the direction you're driving, you're losing the elevation difference between the height of the roof of the car and the trunk. The roof of the vehicle will also slightly interfere with the antenna if it's mounted on the trunk lid. Trunk-mount antennas, however, are popular with CBers because they're easily installed. Usually the base of the CB antenna has a mount that slides over the lip of the trunk lid and two set screws hold it in place and create a ground for the antenna. The only harm to the car is two small marks under the lid where the screws dig into the metal.

Another popular CB antenna model is the cellular look-alike version. Usually available in both trunk-mount and magnetic mount versions, this antenna has the familiar pig-tail look of cellular mobile telephone antennas. Not only is it a stylish antenna, but from the outside it also looks like you have a cellular phone instead of a CB radio. Cellular phones aren't as popular as CB radios with thieves because stolen cellular phones can literally be turned off remotely by the telephone company.

Another antenna that works well and helps avoid theft is the disguised CB antenna. This replaces the AM/FM antenna on your vehicle and looks just like the original. The CB-AM/FM disguise antenna has additional cable and a box that allows the antenna to be used for CB as well as AM and FM radio reception.

Other types of CB antennas include the gutter-clamp mount models, that attach to the rain gutter above the car door, and the full quarter-wave bumper mount. The quarter-wave is so named because it is 9 feet long, electrically one-quarter of a full-wavelength radio signal (36 feet) on CB frequencies. The quarter-wave whip antenna typically is mounted on the bumper because of its height and includes a large shock spring to absorb those low tree branches you're bound to strike.

There are also special CB antennas made for truckers, who usually have a little more room for mounting, and no-ground-plane antennas that allow the antenna to be mounted on a vehicle with a fiberglass body.

Finally, if you plan to talk from your base station to others in your immediate vicinity, you can avoid erecting a large antenna . You might simply try using an antenna that screws to the back of your CB radio!

As you continue to experiment and learn, there are also various accessories you may want to check out to complement your CB antenna installation. You'll no doubt have a lot of fun in the process. ■

Citizens Band 10-Codes

To facilitate communications and permit users to understand each other, especially in a noisy environment, a system of abbreviations known as 10-codes has evolved for use by CBers. Here are some of the more common 10-codes and their meanings.

10-1	Receiving poorly
10-2	Receiving well
10-3	Stop transmitting
10-4	ok, message received
10-5	Relay message
10-6	Busy, stand by
10-7	Out of service, leaving the air
10-8	In service, subject to call
10-9	Repeat message
10-10	Transmission completed, standing by
10-11	Talking too rapidly
10-12	Visitors present
10-13	Advise weather/road conditions
10-16	Make pick up at
10-17	Urgent business
10-18	Anything for us?
10-19	Nothing for you, return to base
10-20	My location is
10-21	Call by telephone
10-22	Report in person to
10-23	Stand by
10-24	Completed last assignment
10-25	Can you contact
10-26	Disregard last information
10-27	I am moving to channel
10-28	Identify your station
10-29	Time is up for contact
10-30	Does not conform to FCC rules
10-32	I will give you a radio check
10-33	EMERGENCY TRAFFIC/MESSAGE
10-34	Trouble at this station
10-35	Confidential information
10-36	Correct time is
10-37	Wrecker needed at
10-38	Ambulance needed at
10-39	Your message delivered
10-41	Please turn to channel
10-42	Traffic accident at
10-43	Traffic tie-up at
10-44	I have a message for you
10-45	All units within range please report to
10-50	Break channel
10-60	What is next message number?
10-62	Unable to copy, use phone
10-63	Net directed to
10-64	Net clear
10-65	Awaiting your next message/assignment
10-67	All units comply
10-70	Fire at
10-71	Proceed with transmission in sequence
10-77	Negative contact
10-81	Reserve hotel room for
10-82	Reserve room for
10-84	My telephone number is
10-85	My address is
10-91	Talk closer to mike
10-93	Check my frequency on this channel
10-94	Please give me a long count
10-99	Mission completed, all units secure
10-200	Police needed at

Radio Extension Speaker
Magnetic Mount Mobile Scanner Antenna
Clip-On Mini Speaker attaches to collar or lapel
Discone Scanner/Ham Roof Antenna

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Communications enthusiasts trust Radio Shack for the "extras" they need. Take the sting out of static with one of our performance-boosting antennas for home or car. Or, add an extension speaker to keep the signals coming in loud and clear.

No matter what your favorite "band" is, Radio Shack offers a complete line of receivers and accessories to help you get the most from your home, mobile or portable communications equipment. Drop by today—we're right in your neighborhood!

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ETC. ETC. ETC.

Radio Shack Highlights

News

Repair Shop at Radio Shack

"You've got questions. We've got answers" is the slogan that this spring launched *The Repair Shop at Radio Shack*, a major new initiative offering the most extensive and convenient name brand repair program available to American consumers.

This innovative Radio Shack program provides affordable, reliable, and guaranteed out-of-warranty repair for more than 45 different name brand home electronics and computers.

Customers with name brand products needing repair can drop them off at any of nearly 6,600 Radio Shack stores and dealers nationwide.

The Repair Shop at Radio Shack is designed to take the frustration and hassle out of the consumer electronics repair experience. Surveys have indicated large-scale consumer dissatisfaction with current name brand repair practices. Repair anxiety, uncertainty, and a lack of knowledge of where to turn for service have typified the feelings and emotions of these consumers. It was obvious that a huge need existed, and Radio Shack has stepped in to fill this void.

The service program covers a wide range of home electronics products, from VCRs and stereo systems to telephones, camcorders, and personal computers. Radio Shack's specially-trained technicians use original parts when they are available or other quality parts that meet or exceed manufacturer specifications.

Most repairs should be completed in 15 days or less. Every Radio Shack repair is backed by a 90-day guarantee.

For customers who are uncertain about whether a product should be repaired or replaced, *The Repair Shop at Radio Shack* has a toll-free number (1-800-482-6399) for assistance in making the right decision.

Radio Shack has 118 service centers nationwide which process 1.8 million products each year. With nearly 6,600 drop-off points nationwide, *The Repair Shop at Radio Shack* is the most convenient service network in the consumer electronics and personal computer industries.

Have a question about name brand repair? *The Repair Shop at Radio Shack* has the answer!

Products

The PRO-51 Programmable Scanner (Catalog #20-308)

The new PRO-51 200-channel handheld scanner searches over 29,000 frequencies at a remarkable 100 steps per second—faster than any handheld scanner ever before offered by Radio Shack!

The PRO-51 is preprogrammed to rapidly scan all frequency ranges allocated to aircraft, fire, marine, or weather service transmissions in any locale. These frequencies can be accessed by pressing the desired service band key (AIR, FIRE, MARINE, or WX) located on the keyboard.

Other features include a 2-second scan delay, memory backup, priority channel selection, 10 channel storage banks, and a large LCD display with backlight.

The PRO-51 operates on either standard "AA" alkaline or rechargeable batteries. The unit has a built-in circuit for recharging NiCd batteries directly in the battery compartment. It can also be used with an optional DC adapter.

The PRO-51 comes with a detachable flex antenna, jacks for an external antenna, earphones, and belt clip.

Suggested retail price: $299.99.

(Frequency coverage, MHz: 29-54; 108-137; 137-174; 406-512; 806-956).

The Amplified Communications Extension Speaker (Catalog #21-541)

The Radio Shack Amplified Communications Extension Speaker is designed for use with mobile CB radios, scanners, cellular phones, and other equipment with 1/8-inch external speaker jacks.

A heavy-duty 4-inch speaker and powerful 7.5-watt amplifier provide the extra volume often needed in a mobile environment. An adjustable mounting bracket is included.

Suggested retail price: $24.99.

The TRC-483 40-channel 2-way CB Radio (Catalog #21-1557)

The Radio Shack TRC-483 40-channel CB radio is a versatile 2-way radio that provides instant access to local weath-

er forecasts and regional weather service information 24-hours-a-day. The TRC-483 is programmed to receive all 10 National and International Weather Service channels that cover the U.S.

The TRC-483 can be used as either a mobile unit or base station. Base station operation requires an optional DC power supply, antenna and cable that connect to the unit's external antenna jack.

The radio can also function as a public address system by adding an optional PA speaker.

The TRC-483 has many other features including an automatic noise limiting (ANL) circuit that reduces noise caused by nearby electrical equipment, an adjustable squelch control to cut background noise between calls, an easy-to-read LCD display, transmit/receive indicators, and an emergency Channel 9 priority switch. A universal mounting bracket for mobile or base installation is supplied.

Suggested retail price: $99.99.

Products At-A-Glance

The following charts are intended to give you a quick reference source for products you're interested in.

For instance, if you're looking for a handheld scanner, use the handy specification chart below. It offers the basic information you'll want to know, like number of channels, frequency coverage, and priority channel. You'll also find similar information in the charts for mobile scanners, home scanners, and shortwave receivers.

Please pay particular attention to the frequency coverage for a scanner you're interested in purchasing. Upon careful examination, you'll notice that all these models are different in one way or another. It's essential that you determine what radio frequencies are used in your area (consult the current *Police Call* and *Beyond Police Call* books that are available at Radio Shack), how many channels you require, how and where you'll be listening—BEFORE you buy your scanner.

Mobile Scanner from Radio Shack

Model Number	PRO-2026
Channels	50
800-MHz Band	✓
200-400 Ham/Gov't	
Aircraft/Air Nav.	✓
Hyperscan	
Search/Scan Rates	16/16
Priority Channel	✓
Instant Weather	
Memory Backup	
Scan-Delay	✓
Frequency Coverage (MHz)	30-50 50-54 137-174 380-470 470-512

Handheld Scanners from Radio Shack

Model Number	PRO-23	PRO-39	PRO-43	PRO-46	PRO-49	PRO-50	PRO-51
Channels	50	200	200	100	10	20	200
800-MHz Band	✓	✓	✓	✓			✓
200-400 Ham/Gov't		✓	✓				✓
Aircraft/Air Nav	✓	✓	✓	✓			✓
Hyperscan		✓	✓				✓
Search/Scan Rates	16/12	50/25	50/25	19/14	--/10	16/16	100/50
Priority Channel	✓	✓	✓	✓	✓	✓	✓
Instant Weather				✓	✓	✓	✓
Memory Backup	✓	✓	✓	✓	✓	✓	✓
Scan-Delay	✓	✓	✓	✓	✓	✓	✓
Frequency Coverage (MHz)	108-137 137-174 406-512 806-824 806-896	30-54 108-136 137-174 380-512 806-960	30-54 118-174 220-512 806-823 851-868 896-999	29-54 108-136 137-174 406-512 806-956	29-50 50-54 137-144 144-148 148-174 406-512	30-54 137-174 380-450 450-470 470-512	29-54 108-137 137-174 406-512 806-956

Home Scanners from Radio Shack

Model Number	PRO-508	PRO-2006	PRO-2027	PRO-2030	PRO-2033	PRO-2034
Channels	20	400	100	80	10	80
800-MHz Band	✓	✓	✓	✓		✓
200-400 Ham/Gov't		✓				
Aircraft/Air Nav.		✓	✓	✓		✓
Hyperscan		✓	✓	✓		
Search/Scan Rates	16/16	50/25	50/25	50/50	--/12	16/12
Priority Channel		✓	✓	✓		✓
Instant Weather				✓	✓	✓
Memory Backup	✓	✓	✓	✓	✓	✓
Scan-Delay	✓	✓	✓	✓	✓	✓
Frequency Coverage (MHz)	30-50 50-54 137-174 380-470 470-512	25-520 760-824 851-869 896-1300	30-54 108-137 137-174 380-450 450-512 806-960	29-54 108-174 380-512 806-823 851-868 896-956	137-144 144-148 148-174 406-512	29-50 50-54 108-137 137-144 144-148 148-174 406-512

Shortwave Receivers from Radio Shack

Model Number	DX-392*	DX-390	DX-375	DX-370
Digital/Analog	Digital	Digital	Digital	Digital
Dual-Time	✓	✓		
AM/FM Stereo**	✓	✓	✓	✓
Direct Access Tuning	✓	✓	✓	✓
Manual Tuning	✓	✓	✓	
Memory Tuning	✓	✓	✓	✓
Scan Tuning	✓	✓	✓	✓
BFO Controls	SSB/CW	✓		
Sleep Timer/Alarm	ST/A	ST/A	ST	ST/A
Headphone Jack	✓	✓	✓	✓
Memory Backup	✓	✓	✓	
Weight	3.7 lbs.	3.8 lbs.	18 oz.	18.5 oz.
Power***	4 "D"	4 "D"	2 "C"	4 "AA"
Frequency Coverage	87.5-108 MHz 150-519 kHz 520-1710 kHz 1.711-29.99 MHz	87.5-108.1 MHz 150-519 kHz 520-1710 kHz 1.711-29.9 MHz	87.5-108.1 MHz 530-1710 kHz 2300-6250 kHz 7100-21850 kHz	87.5 108.1 MHz 522-1620 kHz 520-1710 kHz 2.3-7.3 MHz 9.5-26.1 MHz

*** Includes built-in cassette recorder**
**** Stereo with headphones only**
***** AC/DC Power Optional**

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Radio Shack's 40-channel TRC-226 CB Walkie-Talkie is a real workhorse. With a full 5 watts of power, center-loaded antenna with TNC connector and ceramic filter, the TRC-226 is designed for serious CB communication. A rugged exterior and solid construction make it a dependable companion on long rides. And it's backed by 6600 Radio Shack stores nationwide, so we're always in your territory if you need help.
For keeping in touch on the range, a job site or in the wilds, Radio Shack carries a complete line of handheld CB radios. From reliable 3-channel budget models to full-power 40-channel performers, there's no better way to communicate across the wide open spaces.
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LONG RANGER

Blink . . . and you just might miss it.
It's the new PRO-51—Radio Shack's fastest handheld scanner ever, with 200 channels, 800 MHz and HyperScan™.
PRO-51 scans at a blazing 50 channels per second and searches at 100 per second. And with frequency ranges for air, fire, marine and weather services *preprogrammed*, you can search those bands even if you don't know frequencies for your area!
PRO-51 has priority, lockout and scan-delay. Backlit LCD display. Even a 3-day memory backup if power's lost.
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VRROOOM!
SCAN
MANUAL
BAND
PRI
PROG
L/OUT
MONI
CLEAR
K/L
LIGHT
AIR 1-20
FIRE 21-40
MARINE 41-60
WX 61-80
81-100
101-120
121-140
141-160
161-180
181-200
DELAY
LIMIT
ENTER
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200 CHANNEL DIRECT ENTRY PROGRAMMABLE SCANNER
The other guys have a lot of catching up to do.
Radio Shack®
You've got questions. We've got answers.℠